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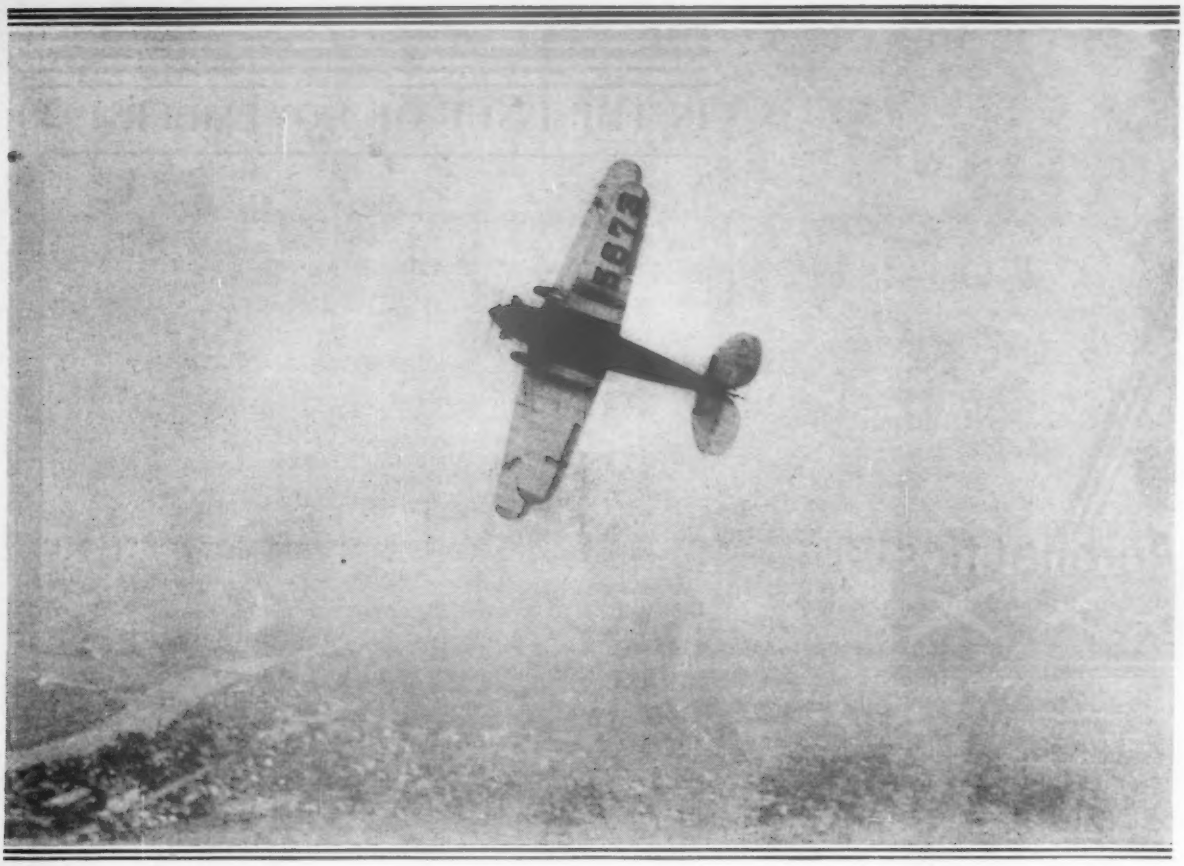
AERONAUTICS: Volume 5, Number 5. Published monthly by Aeronautical Publications, Inc., at 608 South Dearborn St., Chicago, U. S. A. William B. Ziff, Editor and Publisher. E. L. Fogelsonger, Associate Editor. David E. McMillan Jr., Art Director. B. G. Davis, Secretary-Treasurer. R. Stuart Murray, Advertising Manager. New York Advertising Office, 551 Fifth Avenue, New York City. Subscription, $2.50 per year; single copies, 25 cents; foreign postage, $1.00 per year extra. All contributions paid for at regular rates, but the publishers cannot be responsible for the loss of any manuscripts or material submitted. Entered as second class matter, January 23, 1929, at the Post Office, Chicago, Illinois, under the Act of March 3, 1879. Copyright, 1929, by Aeronautical Publications, Inc. Member Audit Bureau of Circulations.

AERONAUTICS Advertising Advisory Board: J. Don Alexander, C. H. Biddlecombe, Archibald Black, Stedman Hanks, P. G. Kemp, George Pynchon, Jr.



WACO PLANE IN VERTICAL BANK

STARBOUND

Swooping, swirling,
Riding high,
Into the blue and boundless sky

Gliding, dipping,
Plunging far,
Hovering to caress a star

Dashing, flirting,
Just to woo,
An airy fairy cloud or two.

BESSIE RAINER FORD.

"Simple duty hath no place for fear"
Whittier

From THE PUBLISHER'S QUILL

Aeronautics ADVOCATES

A unified air service with adequate appropriations.
A great National Air Academy.
Repeal of tax on gasoline sold on air fields.
Unified State and National laws governing aircraft.

HEROES ALL

THE great Cleveland show is past and dead, but still food for thought.

It was a grand success or a ridiculous frost, depending on how you looked at it.

AERONAUTICS has contended for some months past that it was time to stop making a sucker out of The Industry. Aviation progress is now resting on the back of the commercial manufacturer, and ordinary good sense should dictate a privileged position for him in the shape of a little intelligent help from the rest of the nation.

If he is to be given no assistance he should at least be let alone and not coerced or cajoled into a lot of expensive undertakings designed to further the ambitions of a few Chambers of Commerce, and in the case of Cleveland, create new heroes for people to gape at.

It seemed to your humble orator, who circulated around for a few days during the Cleveland Circus, that the real heroes of the occasion were the struggling manufacturers and builders, who wasted much-needed money on booths, and valuable time which could have been devoted to the development of their businesses.

The exhibits and booths were sparsely attended by a crowd composed mostly of boys, potwallopers, and the exhibitors themselves. The auditorium was continually filled with a gaudy music that had the sound of a flywheel cutting through tin, and even the writer, who confidently thought he had the crass aural sensibilities of a hickory tree, was so affected that he had to vacate the premises after a harrowing half hour.

The only place where planes could be demonstrated was the municipal airport, which was located a disheartening distance out into the open country. Demonstrations could only be made before eleven in the morning, the rest of the day being given over to stunts and the creation of heroes.

Stunts and heroes are great stuff, and we are not lacking in proper appreciation of either, but if anyone thinks that a prospective plane purchaser is going to arise from his soft couch at five in the morning and rush madly out without his breakfast on an uncomfortable ride to an airport stuck far back in the hinterland, he had better get his ideas overhauled. Up to date, selling aircraft has been a slow, hard business under the most ideal conditions. There are no records which indicate that anyone has ever been killed in the mad rush to buy.

The net result was that a lot of unfortunate builders, badly needed at home, frittered away their time and cash waiting for buyers to come who never showed up.

Most of these men had been high-pressured into coming by the intimation that they would suffer badly if they were not present with costly trappings. Most of them would have been heartily glad if they could not have been there. We believe that some would have even been contented if the whole show had never happened.

As was to be expected there was a great deal of under-cover resentment and private growling. The blues were freely sung everywhere, but no one seemed to know what to do about it.

Seen from the viewpoint of perspective the affair at Cleveland was not bad as a pure matter of entertainment. Most of the men in the industry were not in the mood for entertainment, however, at that particular time, and would have preferred to sit in their factories figuring out how to avoid a starvation winter.

Hard on the heels of the Cleveland show comes the news of more shows, and still more shows. The ballyhoo is large, and the screws put on everyone again to attend and help pay for the event.

These things are alleged to be good for aviation. They are supposed to help make America air-conscious. It would be better if America were pocket-book conscious of the poor exhibitors, who will soon individually need a benefit if this sort of thing keeps up.

There is only one remedy for this type of ridiculous thing. If a city is "airminded" enough to want to put on a show, undoubtedly for its own advancement, it should do so without annoying the Industry. Those in the Industry should be asked to come as invited guests, and if the city wants a loud noise and fireworks it should pay for it. Under this halcyon condition, a good time might possibly be had by all.

In addition the Aeronautical Chamber of Commerce

[*Continued on page 62*]

AIR POWER WILL

by GENERAL WM. MITCHELL

THE rumblings of impending war in Asia between the Muscovite and Chinese, the attentive attitude of the Japanese, ready to seize any pretext for the occupation of the Asiatic mainland, the interests of the United States in Asia and regard for our possessions of Alaska, Hawaii and the Philippine Islands, all make it necessary for us to "have an eye" to the Pacific and Asia. This applies not only in a military way but commercially as well.

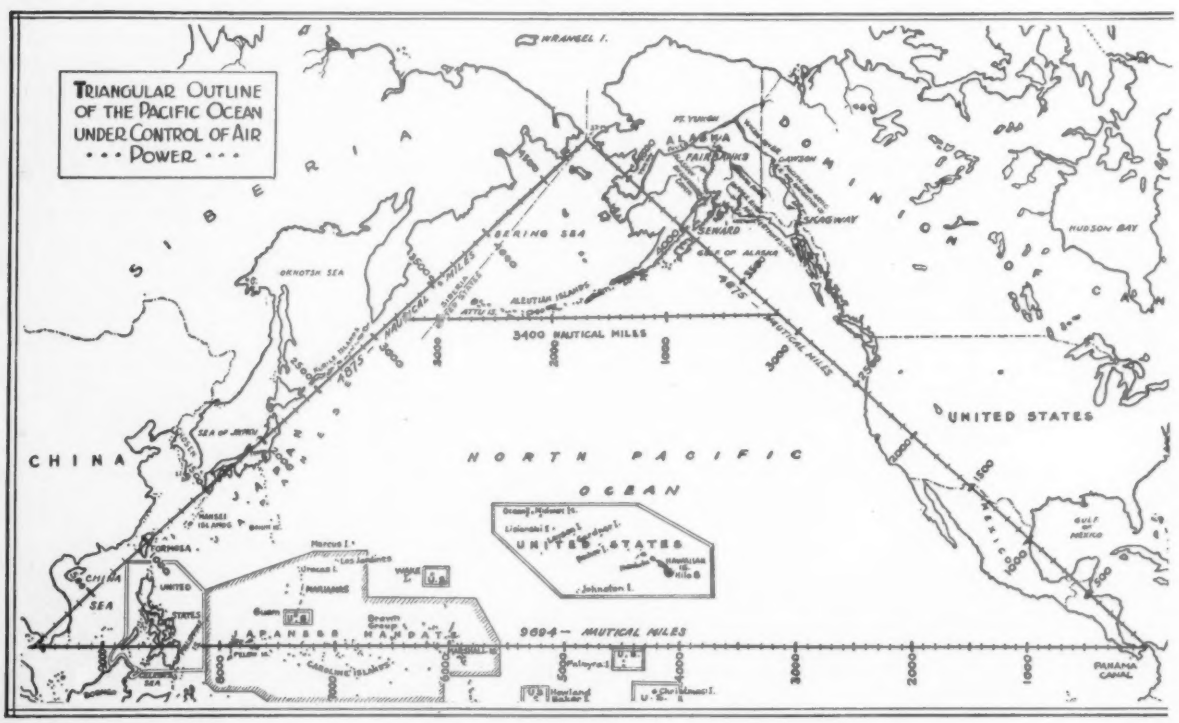
The first three articles that I wrote for AERONAUTICS dealt with the general condition of aviation in the United States, how it has been and is being mismanaged by the present administration, and something about the use of air power in the Atlantic Ocean and in the vicinity of our Panama Canal. In this article, I shall treat of our air power in the Pacific and what it means to us as a nation.

Strategically, the American position with respect to the Pacific Ocean is a very strong one. Most of us have a very hazy idea of what strategy means. With armies, the side that "got the mostest men there firstest" excelled in strategy. With a navy, whoever got the "mostest ships there firstest" excelled. With air power, the one who gets the "mostest airplanes there firstest" is the strongest, whether it be in a commercial or a military operation. Although our position in the Pacific was very strong before the advent of air power, since that time our potential strength has been immeasurably increased if we take advantage of what the air offers us.

We are the only great white power, the home shores of whose territory are washed by the Pacific Ocean. Opposite us is the continent of Asia, containing some 950,000,000 people, or one-half the population of the world. It is with the people of Asia that Europeans have always sought to trade and in many cases this has resulted in war, not only with Asia, but also between the European nations themselves. The World War was fought largely over who should control the trade routes to the Far East and the Pacific.

Today with our Diesel motored sea vessels we need no bases or refueling stations in the Far East, as sailing vessels and coal burning steamers used to. A motor vessel can take on its fuel oil at San Francisco, go to Shanghai or Canton, China, and return without refueling.

Illustrating the strategical position of the Pacific Ocean. Its shape is that of an isosceles triangle of which Alaska is the vertex, and consequently closer to all the vital centers than any other point in the triangle.

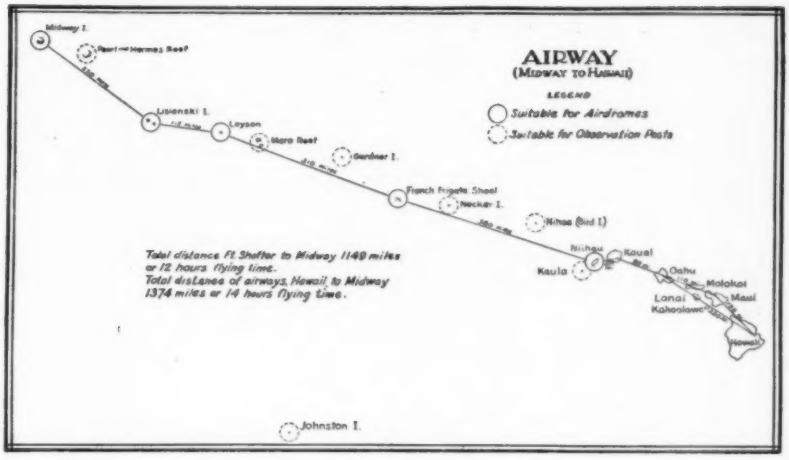


DOMINATE THE PACIFIC

Alaska the Key to the Shrinking Ocean

Traffic by air has changed the lines of communication from one country to another. The routes of commerce and what are known as lines of operation in war (the lines along which war is made) always follow each other. Before the coming of air power, when vessels and warships were the only means of traversing the seas, the line across the Pacific was from San Francisco to the Hawaiian Islands, thence across to Japan or China; but with air power, the shortest route is by way of Alaska.

Alaska is really the key point to the whole Pacific Ocean. It almost touches Asia, the distance across Bering Strait being only 52 miles, with two islands, the Diomedes, in the middle, which are only six miles apart. One belongs to Russia and the other to the United States. Attu Island, at the end of the Aleutians, is no further away from Yokohama, Japan, than is Manila in the Philippines. Airplanes can fly there and back without taking on additional fuel.



Hawaiian Islands: 2,000 miles from both our Pacific Coast and Japan. An important strategical point for both commercial and military flight.

GREENLAND
A D A
New York
N O R T H
A T L A N T I C
O C E A N
WEST INDIES
LEGEND
Linear Outline of Distances in Miles
Outline of U.S. Possessions in the Pacific for Air Craft Bases.
Japanese Mandate

The point I wish to emphasize is that we are so situated that from United States territory on the continent of North America not only merchant ships but aircraft are able to go to Asia and return with a single charge of fuel.

Now, the crossing of the Pacific is nothing. It is no more than a ferry between two points across the water. Airplanes can fly from New York to Peking by way of Alaska in some sixty hours and to the center of China or even India in ten or twenty hours more. It is not miles that count in transportation, it is the time required to negotiate the distance. The vast leagues of the Pacific are shrinking continually under the magic of scientific aircraft development. The day is not far off when neither months, weeks nor days will be used in computing the trip, but hours alone.

From an aeronautical standpoint, it is very interesting to look at the Pacific Ocean in a strategical way. We may consider the north Pacific as a huge isosceles triangle, with its vertex on Bering Strait, one end of the base on the Panama Canal and the other end in the Philippines or the coast of Asia directly opposite.

The sides of this great triangle are approximately 7,500 miles in length, while the base measures about 11,000 miles, or about half the distance around the earth at that latitude. Along the eastern side of this triangle, we find the United States either in possession of, or completely dominating the whole extent of territory, including that part of Canada fronting on the Pacific Ocean between Puget Sound and the Portland Canal, the southern border of Alaska. In any altercation arising between the United States and an Asiatic power, Canada would either openly side with us or run the risk of occupation.

Freedom of maneuver of a military force is dependent on the length of the base. Taking as the definition of "base" the line which connects the military depots or magazines of a country, the United States has a base of 7,500 miles from Alaska to Panama. Any part of this base may be reached either on or over the land and all elements for the raising, concentration and maintenance of military power is to be found within its borders.

The western or Asiatic side of this triangle is very different from our side. The coastline is greatly indented so that a straight line drawn from any one place along its coast to another usually passes a considerable distance seaward. A

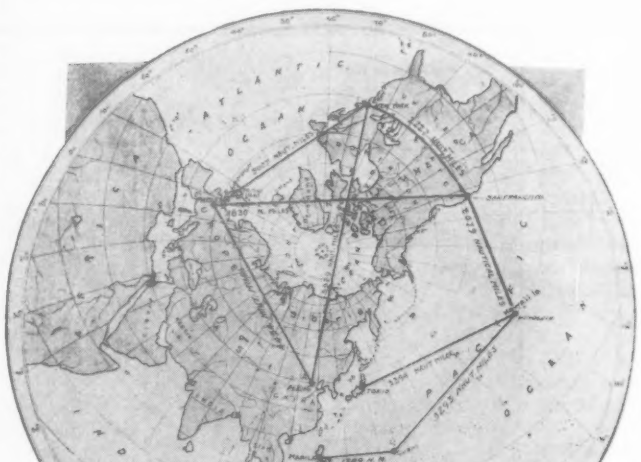
fringe of islands covers the coast of Asia all the way from the Peninsula of Kamchatka to the Equator, varying in distance to the mainland from a very few miles, as at Sakhalin Island, to one hundred in the case of Japan, and about five hundred in the case of the Philippines and Borneo.

These islands are rich by nature, capable of great development and bear very much the same strategical relation to the continent of Asia that the British Isles do to the continent of Europe. In other words, if the islanders in times past were able to dominate in sea power, they rendered themselves not only immune from attack from the mainland but they had the power of initiative against the continent. The strategical development of Japan in this respect has not been unlike that of Great Britain. Hence, we find the policy of Japan to be the complete dominance of all these Asiatic islands, not only as a means for her own military protection but also for furthering her interests on the continent.

Another strategical similarity between Japan and Great Britain is that the latter finds the European continental air power to be the greatest menace to her existence. Practically everywhere on the continent of Asia we find a population more or less hostile to the Japanese. Japan therefore will develop her air power to the utmost. Insofar as the application of her air power is concerned, Japan has the line Formosa-Kamchatka exclusively available, or a distance of about 4,000 miles.

Surveying the two sides of the triangle, we find our side to be a homogeneous strategical entity complete in itself and menaced only from across the Pacific, while on the west or Asiatic side we find an insular empire occupying a base a little more than half the length of one side of the triangle and menaced strategically both from the Pacific and the continent of Asia.

At the base of the triangle, or the line Panama-Manila, we find first an expanse of 5,000 miles of ocean to the Kingman Reef, owned by the United States, but from there on a practically continuous series of islands within short distances of each other, clear to the coast of Asia. These islands are either in the possession of or entirely dominated by Great Britain. The only land encountered between Panama and the Kingman Reef is Clipperton Island, about 1,900 miles west of Panama and claimed both by France and the Republic of Mexico. The United States should acquire this at once. England, through her foothold on these islands, combined with her air and sea power, should be able to control about half the base of the triangle. This, joined up to her base Singapore-New Zealand, covers all the rest of the Pacific Ocean.



Airline distance between centers of population in the Northern Hemisphere. With sufficient air power the United States would dominate the whole Pacific area. Note position of Alaska in this regard.

Having taken this hasty survey of our strategical position, let us consider what is necessary to establish a military depot, sometimes erroneously called a base. It can be said at the outset that by far the easiest depot to organize is an aeronautical one, which at the same time has command of power much superior to that of an army or a navy.

An army may occupy a position and if given a few days to prepare it for defense, may develop it to almost as great an extent as if they had been there for a protracted space of time. If its communications are squarely behind it, and if hostile ground forces have to come across the water, it has little to fear from either land or sea, its only menace being from air power. On the other hand, if an army catches a fleet in a harbor, the army may destroy it, there having been such examples as Cervera at Santiago, Makaroff at Port Arthur, or Napoleon's capture of the Danish fleet with his cavalry, when it was frozen in the ice.

A navy, to establish a depot, must first seek out a harbor with a depth of water of forty feet at low tide, otherwise a wounded battleship will be unable to enter it. If it is not accessible at all times, when it is needed the most will be just the time that it cannot be entered.

With the complexity of modern naval armaments has come a corresponding augmentation of shore establishments. The dockyards take years to build, the technical repair and supply facilities require not only vast sums of money but infinite attention to detail and a great deal of time. This is rapidly becoming so intricate a proceeding that fleets are growing less and less mobile, are chained to their depots and with every change of the theater of operations require a new arrangement of supply points. Any application of sea power at a distance of over 2,000 miles from its base necessitates years of preparation and not merely millions but billions of dollars' expenditure. As naval preparations increase in size and extent, just so much do they became better targets for air attack, and as the utility of the great surface battleship is rapidly drawing to a close, most of the effort expended in large surface naval armaments is a waste of energy.

An air force, on the other hand, can establish itself with the greatest ease. An unoccupied field, a stretch of ocean beach, even the center of a volcano may be occupied and operated from with a minimum of preparation, compared to the installation of a naval depot or the emplacement of artillery of position. The First Bombardment Group landed on and operated from Hatteras Island along our Atlantic Coast with little preparation. All their supplies, including 2,000-lb. bombs, tractors, gasoline and fuel, were landed in three and one-half feet of water. I have landed pursuit planes in an open roadstead, set them up and made them ready for flight in a couple of hours.

[*Continued on page 84*]

PROTECT THE PIONEERS IN AIR TRANSPORTATION

by Congressman John L. Cable*

THE latter part of July this year, Mason and Dixon Air Lines, Inc., established a through air transportation route between Cincinnati, stopping at cities along the route, including my home city of Lima, Ohio, and on to Detroit, Michigan. This was the first company to offer such service to the people of Lima.

The initial flight began at Cincinnati with a great celebration in which the Speaker of the House of Representatives, Nicholas Longworth, Governor F. D. Samson of Kentucky, former Governor James M. Cox of Ohio, and others participated. Several thousand people were on hand when the planes arrived at Lima to offer congratulations to the officers of the company for their courage and pioneer spirit in establishing the line. Mr. J. R. Vorhees, State Director of Aeronautics, and others made short addresses. This scene, no doubt, has been duplicated many times throughout the United States and thousands have assembled in cities to indicate by their presence friendly cooperation, as well as a tribute to the officers and investors of companies engaged in a comparatively new but great commercial industry. As one of that crowd assembled at Lima, I felt that this company and all other air line companies now in operation, particularly the first to venture into this new line of business, not only should have the greatest amount of encouragement, but also that their investment should be protected so far as could be done without affecting the tremendous progress being made in air transportation and the wonderful growth and development of the industry.

As a lawyer practicing in Ohio for quite a few years, I had often been engaged in the Courts and before the Public Utilities Commission of Ohio in hearings where a certificate of public convenience and necessity was an issue. I believe that protection can best come to air transportation companies by means of a Federal law, because a state would have no jurisdiction over the interstate lines excepting perhaps from its police power, restricted to the regulating of air line companies operating wholly within the state or to laws and regulations governing safety of the traveling public in interstate commerce.

The State of Ohio could not prohibit an interstate air line, if it complied with its police regulations, from entering, stopping at such cities as such company might see fit and leaving the state. Congress has full authority, under the Constitution, to regulate interstate and foreign commerce and this should and does include interstate commerce by air.

Why should a second company, not having the courage or initiative to make a survey, establish a new route, develop business and educate the people to travel by air, be permitted to set up a parallel route and take the cream when public convenience and necessity does not demand such service, the pioneer, or first company, adequately taking care of the business offered? The public and the investor have suffered too often when two carriers—railroads, motor bus lines or interurban railways—have both attempted to carry on their business in a territory when there is but sufficient business for one. This has put companies out of business or raised rates.

Believing that the "public convenience and necessity" rule would be of great benefit, not only to the public and the present investor in the airplane industry, and would bring in more capital for the establishment of new routes in territory not now served by this mode of travel, I wrote Mr. Ziff, President of *Aeronautical Publications, Inc.*, for his opinion on the subject. He was kind enough to give the idea serious consideration, but was of the opinion, "There seems to be plenty of available money for development of every type and not much hesitancy about using it. The great difficulty does not seem to be the attracting of capital at this time. The major difficulty is in selling the people on the convenience and soundness of air transportation."

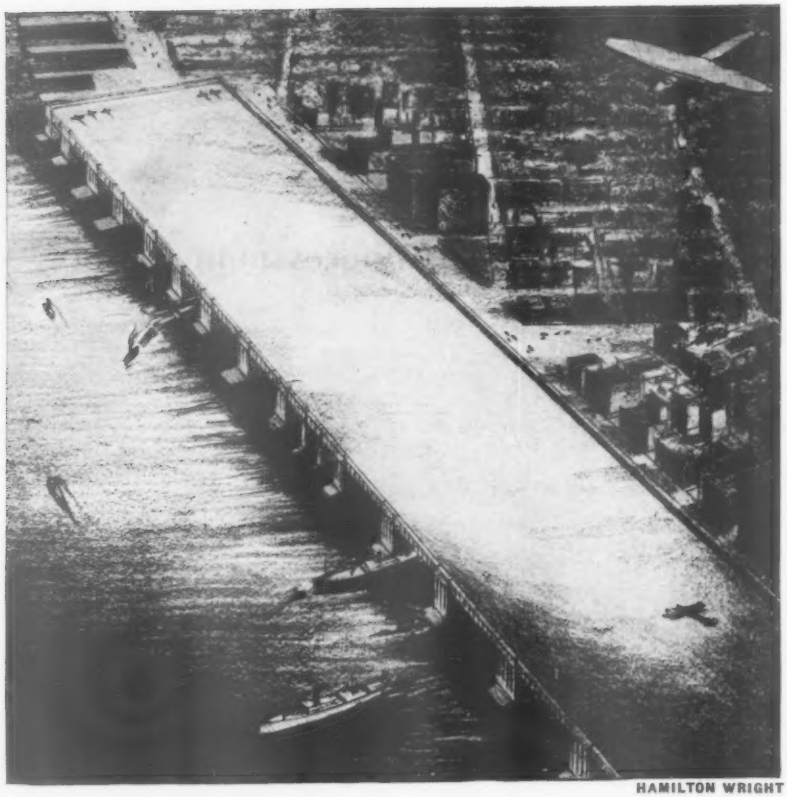
My thought was, that to protect the investor would encourage others to make new surveys, establish new routes, purchase more planes and develop new air lines; that the certificate of public convenience and necessity rule would have a stabilizing effect on the industry.

Mr. Ziff's reply raises another question, and that is, for example: the Mason and Dixon Air Lines, Inc., and all other companies similarly situated, must necessarily expend a considerable amount of money, as Mr. Ziff says, in selling the public on the convenience and soundness of air transportation. The pioneer air line spends money for this purpose, and, building up a business until the income may perhaps justify reduction in rates, a second company enters the field and takes part of the business. The second company thus benefits from the dollars spent by the first company in educating the public to travel by air. The first company may have built up its business until it was prepared to offer additional facilities in the way of bigger and better planes for the transportation of passengers and express matter; the second company stepping in divides the business until by such division the income of each

[*Continued on page 82*]

*** 4th District, Ohio, elected in 1920 to 67th Congress, serving also in 68th and 71st Congress. Author of several major Federal Laws. A deep student and sincere friend of aviation.**

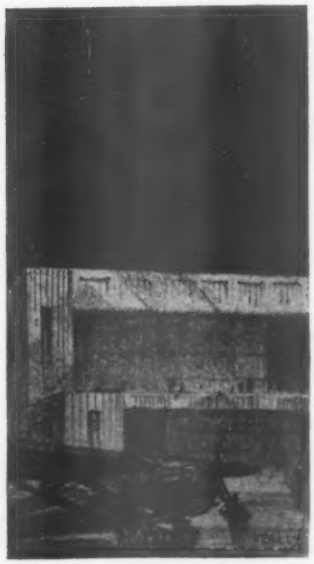
by Francis Keally



HAMILTON WRIGHT

Proposed landing platform over piers of North River, New York City.

PLANNING THE MODERN AIRPORT



Famous architect and student of landing field problems. Other articles in this important series will follow.

THE building of airports brings us into a world of new perspectives in which the view of the landing field from the air is only secondary to that obtained from the ground. Surely, then, the airport builder who is able to fly over the tallest mountains should be able from a lesser vantage point in the air beneath which the whole country is spread out like a map, to determine the location for the site of the airport.

Its first requisite is accessibility. Since speed is the object of aviation it is vital that the airport be easily reached. Not only should the airport be designed with vision and foresight to handle passengers, light freight or express, and mail with the facilities corresponding to those enjoyed by the modern railroad terminal, but it is absolutely necessary that it must be so situated as to enjoy rapid transportation to and from the city which it serves. This can be accomplished by quick speed boats, by a location along a railroad or trolley line leading to the city, by broad highways, and by means of small taxi planes plying between the city and the airport.

A site where rail and motorways already converge possesses an initial advantage which can only be overcome by creating means of accessibility of the chosen site.

An airport adjoining a body of water is, generally speaking, the more desirable, because it protects the landing area against obstacles on the water side. In the future, the amphibian plane will probably be the popular plane with amateurs on account of its being able to land on water or land in case of necessity, which increases the factor of safety for forced landings. The number of possible sites along the water in the United States must be considerable. Moreover, it is always possible to dredge areas for the landing of amphibian planes.

HAMILTON WRIGHT

Proposed landing platform over P. R. R. station and postoffice, New York City.

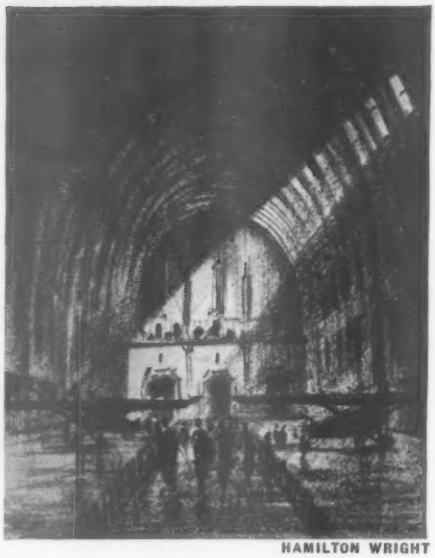
The question of ample area is quite as vital as that of accessibility, but freedom from obstacles in the vicinity of the site must also be considered. It should be possible for the public safety to limit the erection of obstacles in the neighborhood of airports. The city planning commission or whatever constituted authority has charge of the municipal airport should cooperate with the municipal, borough, or country authorities in which the great airport is to be located to restrict the erection of telegraph and telephone poles and wires, tall buildings, and high railroad grades in the vicinity of the site. Telegraph wires near

Proposed double-deck hangars—better utilization of space and more economic construction.

an airport should be tubed and placed underground; dangerous clumps of trees should be removed.

As the business of aviation increases, large areas will be required to take care of the increased volume of traffic which will call for the frequent arrival and departure of planes, without interference. Planes will arrive and depart every few minutes. This will demand a large organization of attendants, mechanics, and equipment to take care of passengers and express and mail shipments corresponding to the organization of a great railroad terminal. Additional space will be required for taxi cabs, busses, sightseeing cars, private autos, individually owned planes, all of which must be provided for without restricting the space of the airport itself, or jeopardizing the safety of pilots and passengers. It is therefore desirable that the great air terminal be located to permit an expansion of at least one hundred per cent without scrapping the original layout.

The early railroad depots were not built with the foresight which the expansion of the railway industry has since justified. Often they were erected on the fringes of the city amid sordid surroundings, and, again, in its very center, which usually brought opposition from the citizens who objected to locomotives puffing down their main boulevards. They were, almost invariably, too small. Even the building of huge railroad terminals has not always kept pace with the growth of traffic. Both the Pennsylvania and Grand Central stations in New York are now too small for the present traffic demands and yet a few years ago the architects of these terminals were criticized for their generous layouts.



HAMILTON WRIGHT

Interior of future air terminal, with facilities similar to R. R. stations of today.

Aviation, young as it is, has not kept pace with the demands for larger and better airports. Croydon field in London, built at a cost of $600,000, was scrapped a year ago and rebuilt at a cost of approximately one million dollars.

Like a union railway depot the great air terminal planned with vision, for the future expansion of air traffic, must permit passengers to arrive by one air line and to leave by another from the same field. Commercial aviation will lose much of its attraction if a passenger arriving at an airport ten miles south of the center of the city is obliged to cross the town in order to leave from another airport twelve miles to the north, a journey of twenty-two miles through crowded traffic. The handling of passengers at our present airports is something which can be improved upon. Courteous, efficient service with dignified surroundings is necessary to win the confidence of the public on the ground. This calls for a careful and orderly arrangement of buildings and open spaces for the arrival and departure of passengers, express and mail by air and on the ground.

Having chosen the site it is the architect's business to work in cooperation with the engineer, aviation expert and owners to produce an airport that will combine practical efficiency with beauty. Many of our present airports are experimental stations rather than traffic terminals. They look like war emergency fields. There is no reason why an airport should be a blot on the landscape, a huddle of unattractive hangars in a dreary, dusty field, reached by muddy roads. In fact the popularity of aviation with the traveling public will be immeasurably increased by presenting it in attractive surroundings, just as some of our great railroad terminals appeal to the eye of the arriving and departing traveller.

The problem which faces the architect, as the servant of the transit and aeronautical engineers and the public, is many sided. But the buildings and grounds can well be so treated as to form a beautiful park-like area of which the community may be proud. The spaces between the asphalt runways with their borders of white concrete for the take-

[*Continued on page 90*]

Mr. Keally to extreme right. Next to him, H. Wiley Corbett, noted architect, and two air mail pilots.

EMPLOYER'S AIR LIABILITY

by
Leo T.
Parker*

Bailey Samelow's regular papers on Aeronautic Law will be resumed with the next issue.

A DISCUSSION OF OWNER'S LIABILITY IN CASE OF ACCIDENT OR INJURY

IN many litigations involving the liability of employers for damages as a result of injuries sustained, or caused third persons by employes, the outcome of the controversy is dependent upon whether or not the employe was acting within the scope of the employment when the accident occurred.

Frequently, persons confuse the terms "within the scope of the employment" and "in the service of the employer." It is important to know that an employer may or may not be liable for negligent acts done by an employe who is in the service of the former, but the employer *always* is liable for injuries *negligently* effected third persons by an employe who acts within the scope of the employment.

Also, an employe who is "in the service of his employer," may not be "acting within the scope of the employment" when the injury is sustained. Under the former circumstance the employe may or may not be entitled to compensation, but he always is entitled to compensation for an injury sustained, *as a result of the negligence* of his employer, while working within the scope of the employment.

The expressions "in the course of employment" or "within the scope of the employment" are synonymous. However, these expressions are *not* synonymous with the term "during the period of the employment." The latter term means the actual period each day the employe is performing his regular duties. An employe is not legally required to be in the act of rendering services to his employer to be within the scope of the employment. In fact, under certain circumstances, an employe's act is within the scope of the employment, for which the employer is liable, when actually the act is detrimental to the employer instead of being a service.

* Member of the Ohio Bar

EMPLOYER'S LIABILITY FOR OWN ACTS

MOREOVER, it is well settled that an employer always is liable for injuries caused third persons, as a result of his own negligent acts, to the same extent as where an injury is caused by an employe who acts within the scope of the employment.

On the other hand, circumstances may exist when neither an employer nor air corporation is liable for injuries to third persons, as where the injured person failed to exercise care to protect himself against an injury.

However, in order to clearly impart legal knowledge of the legal relation and liability of employer and employe to third persons, such as passengers, visitors and trespassers, probably it would be practical to review the leading higher Court cases in which are discussed the various phases of the law on the subject.

PILOTS ACT WITHOUT SCOPE OF AUTHORITY

AN excellent illustration of the non-liability of an employer for the acts of an employe, outside the scope of the employment, is supplied by the records of Burns v. Herman, 113 Pac. 311.

In this case it was disclosed that several business men in a city arranged to have a public entertainment at a public grounds and hired an airplane to participate.

At the end of the day the owner of the airplane instructed his pilots not to fly and then left the field. As soon as he had left, the employes proceeded to make ready to ascend, and a boy who walked across the field was killed.

The boy's parents sued the business men and the owner of the airplane for damages. However, it is interesting to observe that this Court held the latter not liable, saying:

"These people, including the boy, voluntarily left their place of safety, and, with full knowledge of the danger, if any . . . . though warned to stand away from it, and after defendants had called off the exhibition and left the grounds the attempt to ascend was made, not by request of defendants, or any one representing them, but at the demand of the spectators themselves. Under such a state of facts, we do not see . . . . how defendants can be held liable."

MUST WARN SPECTATORS OF DANGER

WHILE it is true that spectators are bound to exercise care to protect themselves against injury, it, also, is well established that the owners and managers of airports, and other places where airplanes ascend, are liable for

[*Continued on page 76*]

Aeronautics presents

SPARTAN C-3, a three place open biplane which has just been put into production.

Powered with Wright J-6 150 h.p. motor. Weight 1555 lbs. Useful load 915 lbs. Cruising speed 100 m.p.h. with open throttle 115 m.p.h. Lands at 42 to 48 m.p.h. according to load. A good sporty plane compietely equipped with requisite instruments. Price $8,750.00 flyaway Tulsa.

THE TRAVEL AIR MYSTERY SHIP which created a sensation at the Cleveland Races by winning over all contenders on a 50-mile closed course with an average 194 m.p.h. and a maximum of 228 m.p.h.

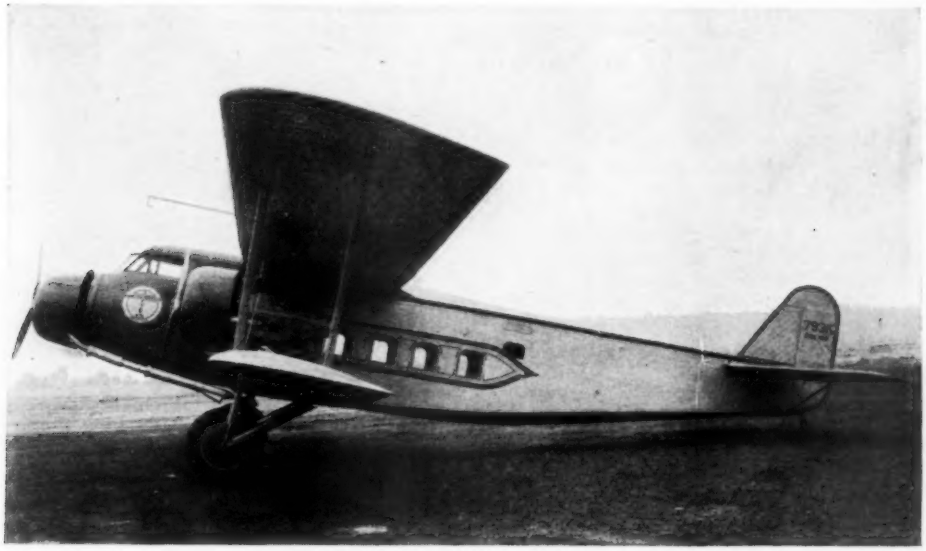
Overall span is 28′4″. Overall length, 28′, net weight 1465 lbs. Loaded, 1925 lbs. Fuel capacity 42 gal. Oil capacity 5 gal. Cruising range 550 miles at 1500 r.p.m.

XUM

FOUR OF THE LATEST

NEW BOEING TRANSPORT, a new luxurious tri-motored biplane powered with Pratt and Whitney Hornet motors, enabling a take off of its 17,500 lbs. weight in 11 seconds.

Overall length 55 feet. Height 15 feet. Rate of climb 900 feet per min., with service ceiling of 15,500 feet. With all power open this big craft does 135 m.p.h. Built to carry 18 passengers and baggage.



THE FOKKER F-32, just purchased by Universal Air Lines, is the largest landplane yet built.

Designed to carry a useful load of 8,700 lbs., this huge plane weighs 13,880 lbs. empty.

Powered with four 525 horsepower Pratt and Whitney Hornet engines carried in tandem. Maximum speed 140 m.p.h. Cruising speed 120 m.p.h. and a service ceiling of 18,000 feet.

WINTER LETDOWN IN AIR STOCKS FORESEEN

by
B. C. Forbes
and
R. W. Schabacker

The aviation industry must beware of over-expansion at this time, says B. C. Forbes.

THE beginning of the cold-weather season throughout much of the country finds some rather natural falling-off in spectacular aviation flights calculated to gain publicity for individual companies and individual stocks; but this will not impair the more fundamental growth of aviation as a basic industry—providing such growth is maintained at a conservative rate.

The principle that industries move somewhat in cycles of expansion and progress is not unfounded. Past history has shown that abnormally high rates of production in any industry cannot be maintained permanently any more than depression in a sound industry proves permanent. Business pays for its periods of over-enthusiasm by succeeding periods of comparative quiet during which the previous gains are being consolidated, purchasing power catching up and consumption overtaking enlarged productive capacity.

This is particularly true of a new industry like aviation. No one doubts the permanent place of aviation in the industrial and economic picture, and no far-sighted analyst can fail to see the tremendous promise of its expansion in coming years. But such expansion cannot be unduly forced without penalty. If it is so forced, then the industry suffers from readjustment which may impair public confidence to such an extent that even reasonable and normal progress is delayed.

The real danger, therefore, lies within the aviation industry itself rather than with public acceptance of its high place in the modern scheme of things. Aviation need not fear lack of public appreciation. What it must fear most is its own lack of foresight if it allows productive capacity to get too far ahead of that constantly growing but gradual demand for aviation service.

Such logic must not be construed as indicating lack of sympathy with efforts to develop business. They are entirely necessary—they indicate the healthy aggressiveness of the industry. The point is entirely a matter of degree. Expansion of consumer demand is certain, but the danger lies in too optimistic and reckless expansion in excess of the actual growth in consumptive demand.

That being so, any tendency toward cutting down too-rapid expansion in the aviation field will be a favorable, rather than an unfavorable, factor. For many months authorities in the industry have watched with growing concern steadily-mounting "inflation." Producing corporations, schools, flying fields, accessory plants—all have sprung up with surprising vigor all over the country.

This is natural—and characteristically American. But there is little doubt that expansion and multiplication have outrun economic need at the present stage of development.

More than ever before, and more especially in the aviation industry, therefore, it behooves the investor in aviation securities, just as much as the corporation head, to scrutinize fundamental conditions before hastening into undue expansion of his commitments. Perhaps the weakest part of the phenomenal progress of aviation is that based upon stock promotion.

With public enthusiasm in the field of stock market trading at a higher level than ever before in history, with more funds available than ever before on record, and with a generally prosperous business background, the temptation to promote securities of questionable economic prospect has been especially marked in the aviation field.

The only result that seems logical to the experienced economist and market analyst is a future period of readjustment, during which the weaker sisters must present a discouraging picture and during which many of the smaller and less necessary promotions will either disappear or be taken over by the larger and stronger concerns.

The tendency toward merger and combination is already definitely apparent. While business is good, terms of share

[*Continued on page 98*]

THE INVESTOR

With aviation stocks changing position rapidly in an industry complicated by swift growths and rapid amalgamations, the opportunities for both wise and unwise investment are large. It is only on the basis of accurate and newest information that proper judgment of value may be achieved.

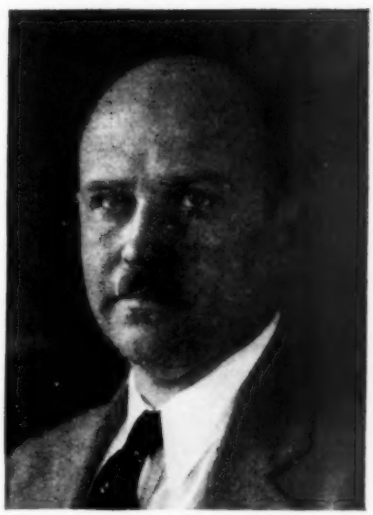
In order to service those readers who are interested in investment possibilities AERONAUTICS will secure the best available information on all current investment possibilities on request. Queries should be addressed to *Aeronautics Advisory Investment Service.*

IN THE FLOODLIGHT

Squadron Leader A. H. Orlebar of Britain, who recently bettered all existing speed records.

Clarence M. Young, who recently became assistant secretary of the Department of Commerce, in charge of Aeronautics, succeeding Bill McCracken.

Dr. Wade Hampton Miller who has become the first commercial flight surgeon creating a new vocation in America. He is connected with Universal.



The Prince of Wales, who has just earned his pilot's license and who may be expected to use the aerial ways like our own Lindbergh, for most travelling.

UNDERWOOD & UNDERWOOD PHOTOS.

A MONTHLY REVIEW OF A FEW OF THOSE WHO HAVE RECENTLY ADDED LUSTRE TO THEIR NAMES

FEDERAL APPROPRIATIONS

The Air Service's Meager Share

by Margaret Robertson*

THOSE who have occasion to familiarize themselves with the annual appropriations and expenditures of the federal government know full well that they will not only remain at the present high peak of approximately five billions but that they will steadily increase. The vanishing rights of states and the numerous new enterprises taken over by the federal government continually increase our supply bills at each session of Congress.

The announced intention of every President to reduce expenditures has long been an old story to those who watch these matters, but the people must be told something to give them hope of relief from their heavy tax burdens and they always like to read a promise that this is to be done. It gives them that new and invigorating sensation of hope which the husband experiences when his heretofore extravagant wife lays before him her greatly reduced budget for "next month."

We have been recently told by the press that the Chief Executive is going to reduce our governmental overhead for the next fiscal year. How is he going to do it? He purposes to bring this about by greatly reducing the appropriations for the army and navy. There is a reason for this.

The army and navy are not popular with our pacifists—and there are a lot of them. The army and navy are not popular with a great number of people for other reasons, and sad, but true, the army and navy are not popular with many members of Congress—a large number of them. And since the President is entirely dependent upon Congress to execute his plans it is rather to be expected that he should choose to reduce an expenditure which it might also please Congress to reduce. Hence the army and the navy.

But that is not the whole story. If any considerable reduction in appropriations should be made the brunt of that reduction will fall heaviest upon the newest branch of both services—the army and navy air corps. The reason for this is obvious also. The air corps is a new baby and it hasn't been taken to the heart of the General Staff as closely as it might have been. Of course the baby is there and it bears the family name and there must be some evidence to outsiders that it is being properly cared for. But all the other members of the family had been together for such a long time. They understood each other and were getting on nicely and harmoniously as brothers and sisters when this new baby was born. The older brothers and sisters were too old to easily adapt themselves to having a new little brother —and they haven't yet forgiven him for getting born. Anyway he's such a precocious brat. Gets in their way entirely too much. Should the President ask the General Staff to draft a plan which he will submit to Congress and should he insist that some reduction just has to be made, isn't it reasonable to think that the infant branch of the service shall be the one to make the sacrifice—or at least take the heavy end of it?

We know that as a "war to end war," the World conflict was a failure. Peace pacts and Kellogg treaties will not preserve us and we, with reason, anticipate another—and a more deadly war. And in that conflict the heaviest burdens will fall upon the air corps. Handicapped and against odds, that branch of the service is today going on with its development. The spirit of the air corps could not be broken. But it can use all the encouragement that Congress and the people will give.

The total appropriation for the army for military activities for the fiscal year 1930 is $331,000,000. Of that appropriation only twenty-two per cent is to be expended for the air corps, including pay of officer and enlisted personnel and equipment.

Of the $360,000,000 appropriated for the navy and marine corps only 16¼ per cent can be expended for the air branch.

The pay of the pilots of the army and navy is ridiculously small. The largest

[*Continued on page 106*]

* Secretary to Congressman Joseph W. Byrns, 6th District, Tennessee.

INAUGURATING AND OPERATING AN... AMPHIBIAN LINE

by
Richard C.
Marshall

Vice President and General Manager, Thompson Aeronautical Corporation

FROM the viewpoint of the casual observer, or even an experienced air transport operator, the problems to be solved in inaugurating a regular scheduled passenger, mail and express amphibian line should not differ widely from those encountered in starting the more familiar type of air line employing land planes.

Also to the layman, the advantages offered by one line over another would not seem to be great. But, as a matter of fact, the problems which arise in starting an amphibian route are many, while the superiority of such a line over any other is also marked to a high degree.

There are perhaps three factors of major importance to be considered before beginning operations on any form of air route today. The first, of necessity, is finance; the second, personnel, and, the third, equipment. But even with the apparent similarity they would seem to have in the starting of all air lines the disparity is not small. Other likenesses in operation difficulties are in-

On The Ramp at Cleveland.

cidental. Therefore, let us turn to the more important differences and problems.

Granting that the prospective operating company has sufficient capital the questions of personnel and equipment predominate. The former, of course, may be divided into three subheads, namely: executive, pilots and mechanics.

Working on the presumption that the company has adequate financial backing, it is also logical to believe the executive personnel is there. So that phase may be passed by; for, the more serious problems arise in the operations division.

A company starting the common air passenger system has precedent to follow. The Thompson Aeronautical Corporation, in commencing its amphibian line between Detroit and Cleveland, had no prototype to model after.

It was necessary for us to secure a terminal location in each city near enough to the center of the business district to give the line adequate advantages over the lines using airports to assure it of a profitable patronage.

In Cleveland we found that most of the water front property, possessing the qualities we considered essential for an amphibian base, was owned by the city or national government. And, as is the case in almost all dealings with governing bodies, there was considerable red tape to be untangled and straightened out before we were able to obtain our present terminal location at the foot of East Ninth Street.

It was less difficult for us to acquire our Detroit terminus, as the property was rented from an individual.

While negotiating for terminal locations at each end, it was discovered that the price asked in each case was prohibitive for a single organization such as ours to meet. Four hundred thousand dollars was the approximate value of the Cleveland property, owned by the United States Government. The Detroit land is part of a $3,500,000 estate, and we would have been required to take over the whole tract at that price had we decided to buy it; for the owners did not wish to sell it in part.

We were, therefore, forced to procure our amphibian bases at a very high rental. Also, we were required to sign a rental lease for 12 months on each parcel although we are able to operate our line only seven months of the year because of weather conditions and the freezing of the Detroit River and Lake Erie.

There is one remedy we can see for this almost prohibitive cost of a waterfront terminal: It is the need for cities such as Cleveland, Detroit, St. Louis and others to build municipal seaplane and amphibian bases just as they have airports.

After deciding upon the terminals and getting the work under way for the construction of ramps and depots, the question of equipment, pilots and other matters, to which we had already devoted considerable thought, was given our full attention.

The Amphibian, says Mr. Marshall, is the best type for general transport use.

An inspiring scene of modern comfortable travel.

We decided to use Keystone-Loening amphibian Air Yachts for several reasons. First, we had faith in their sturdiness of construction, their all around ability as flying machines and, too, we were familiar with their excellent records, made in all kinds of service.

One other important factor which was instrumental in prompting us to decide upon the Keystone-Loening was the fact we knew we would be pioneering a new type of travel in this section of the country. It was our belief that travel on the line would hardly warrant a larger craft for the first season. Our judgment has not been entirely borne out in the latter case as it is not uncommon for us to refuse as many as six and eight requests for passage on one plane. Also, several times, when we have deemed it advisable, we have run second sections.

The Thompson Aeronautical Corporation has three Loenings in its service, powered with Wright Cyclone engines of 525 horse power.

Our schedule calls for four round trips daily from each city at 10 a. m., 12:30, 3 and 5 p. m. It is so arranged that but two planes are flown each day while the third is held at our Cleveland hangar where it is gone over and checked for every possible defect which might occur in the ship or motor. Also, at the end of each scheduled flight the plane is gone over by two mechanics under the direction of the co-pilot who is a licensed mechanic.

Of equal importance to equipment is the need of getting pilots experienced in flying amphibian planes. This was, and still is, a very difficult task inasmuch as the only trained amphibian pilots today are those in the army and navy air service. Consequently, we have found it necessary to train some of our pilots. Other amphibian operators will undoubtedly have to do likewise until the supply is greater.

At Detroit and Cleveland we have huge, stationary ramps which permit our planes to taxi to and from the water under their own power, and load and unload passengers, baggage and mail on land.

Because the ramps are stationary it has been difficult at times for the pilots to maneuver their ships on to them during strong cross winds. This raises the question as to whether future amphibian terminals shall have floating ramps which can be swung into the wind and thus facilitate the landing of planes.

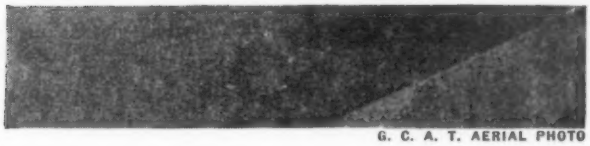
With floating ramps it would probably be of material importance to have passenger stations, combined with ticket offices, mechanics and baggage rooms

[*Continued on page 56*]

LANDING AN AIRPLANE BY PARACHUTE

by

CAPTAIN ROSCOE TURNER*



G. C. A. T. AERIAL PHOTO

NOW that I have demonstrated that an airplane may be landed by a parachute I believe that the time is near when every up-to-date plane will be equipped with a mechanically released, built-in parachute. By this means a crippled-in-the-air-plane may be landed safely saving the entire load of passengers, pay load and the airplane from wrecking.

It requires no stretch of imagination to visualize every airplane of the near future with a built-in parachute snugly stored in the center wing section in such a way that no evidence is in sight of the latest safety device. Neither will the lines of the plane have to be changed. It has been fully demonstrated that parachutes can be and are being used to land individual passengers safely. It is only a step further to apply the same safety device to a group and to the airplane.

It was only after many experiments with parachutes and weights and much study as to air resistance and other conditions entering into the project that I landed the first airplane by aid of a mechanically released built-in parachute. Had I not been confident of success I would never have tried is before 15,000 spectators at Santa Ana, California. Now that the initial test has proven so successful I look for rapid development along this line of safety first.

In this particular instance the result was accomplished by replacing the second rib on each half of the wing with a heavy ply-wood to take all the compression strain of the two ribs in general use. A steel rib was placed at the center section of the two half wings and the whole compartment thus created was floored with heavy ply-wood. This gave greatly increased strength to the wing and at the same time afforded a solid compartment for the pack.

At each of the four corners of the compartment a heavy coil spring was placed, also two at the center. Each spring had a recoil force of 2,000 pounds and was placed in a solid steel container bolted through the spars.

By this arrangement the releasement shock was equally distributed and a force of 12,000 pounds thrown against the pack at the release of the springs.

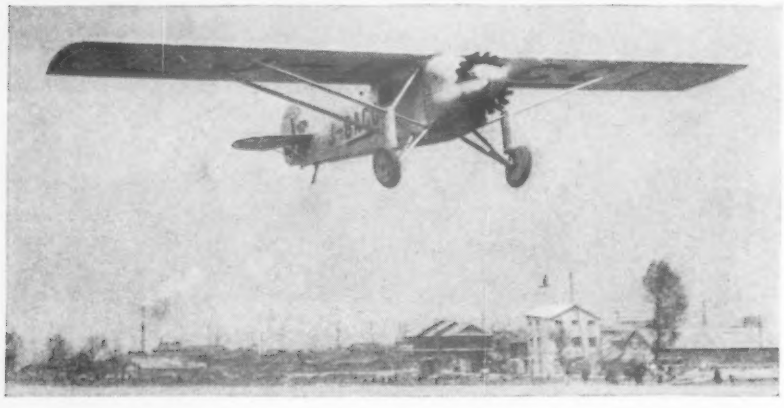
On top of the six springs rested the basket which was the parachute carrier.

[*Continued on page 62*]

*** Captain Turner served as First Lieutenant during the World War on the American forces. He has been in commercial aviation since and is an accomplished stunt flier. Now traffic manager and chief pilot of the Nevada air lines.**

JAPAN'S HAMPERED

by E. Percy Noel*



The plane to the left belongs to the Osaka Mainichi newspaper.

AVIATION pioneers can remember that there were always a few pupils at some of the flying schools before the World War, who were regarded as permanent. It seemed certain that they would continue to be pupils, as long as they lived and had funds to pay for crashes; for they would never be able to pass the Aero Club of America's simple test for a pilot's license. Among these "life pupils," as some wag dubbed them at the time, no nationality was more conspicuous than the Japanese.

The word soon went about the world that Japanese had a screw missing in their brains and that this small piece of hardware was what they needed to be able to fly. No matter how clever they might be at juggling, tight-rope walking or jiu-jitsu, the Japanese lacked either the average Occidental's sense of balance, or else—another theory — they simply could not do two things at once.

Ground fliers and arm-chair aviators sat around and discussed this question with grave faces. The explanations given were full of imagination and hearsay; but it never occurred to anyone that the premise might be wrong. Just because the Japanese who came to America to learn, were still unable to fly creditably, was no proof that all other Japanese were equally destined to nothing but a crashing career in aviation.

History has proved that Japanese can fly. It is not necessary to recall the flight from Tokyo to Paris of one of the planes of a great Japanese newspaper. It is better to describe the difficult conditions under which Japanese are flying from day to day over and about their long archipelago and mention their new air lines which will eventually revolutionize communications in the Orient.

Of all civilized countries Japan stands at the top as the hardest place to land. It is composed of eight large and about eight thousand small islands. There is a backbone of jagged mountains running through each of the chief islands, punctuated here and there with craters—active and defunct—and seven long chains of volcanic mountains. All these peaks and ranges are frequently hidden by clouds or mist, making them fatal impediments to the machine whose pilot fails to guess where they are.

Every available square yard of ground in the fairly level places is utilized for agriculture or industrial purposes, except in the far northern parts where no one wants to go. If the agriculture was of the kind that did not convert Mother Earth into airplane traps, it would not be so bad; but instead of fields of corn or wheat, either of which are not impossible for a pancake landing, there are rice paddies. Rice is grown wet and dry, but ninety per cent is grown wet, which means that rice paddies are squares of slimy mud, intersected by irrigation ditches, large and small.

There are, it is true, some sandy beaches on these islands of Japan, but the fine sand which packs itself close and solid is exceptional and most of the beaches of loose, yielding sand are almost as wicked as the rice paddies.

We would also direct attention to the trees. They are much noted in art and poetry for their graceful attitudes and curious growth; but never seem beautiful to the aviator with dead motor who finds one in his way, just as he thinks he has chosen a nice place to land.

Trees are a special pride of Japan, where reforestation has been in force for centuries, and so are the mountain lakes,

* Aviation Editor, War Correspondent and Flier since 1910. Now located in Japan.

PROGRESS

The Eagle of the Orient Is Just Learning the Use of Wings ▲ ▲

KIZUGAWA: Japan's first international airport. Planes of Japan Air Transport Company in the foreground.

both of which make disagreeable hazards to fly over, especially on sunny days. Furthermore it rains about one-half the days of the year and the humidity, rising from the warm sea makes powerful anti-flying arguments when it reaches the cool mountain air.

In spite of these difficulties, the military air authorities have succeeded in establishing a few flying grounds and the Navy Air Force has its landing places and hydro ports. Thus, between them, they have been able to train some excellent airmen. The equipment in both army and navy aviation is none too good. It includes too many machines that would long ago have been condemned in the U. S. A.; but men who operate such out-of-date planes are all the better pilots when they are given something good to fly.

Civilian pilots are less numerous, and very few indeed have had commercial experience or many hours in the air; but there are some first class fliers among them, including several women.

Having learned that the failure of the early students in America was due to their lack of fitness for aviation, all known tests are applied to candidates before they are accepted either for the army, navy or civilian schools. Either because the tests are too severe or because there is something lacking physically in many of the applicants, the percentage passing the tests is low. One point has been established which is that temperamentally the Japanese are battle airmen born, in that they have nerves of iron and are not afraid to die.

It might be said that Japanese were entirely too indifferent to death to make good commercial pilots, because they would apply this indifference to their passengers, as well as to themselves. On the other hand it is well known that fear can turn the most reliable pilot into a most dangerous one, and being free from any possible weakness of that character perhaps balances the Japanese over-indifference to death. Furthermore, their highly developed sense of loyalty and personal responsibility stimulates their attention to the protection of the lives

of passengers entrusted to them.

It is well known that the Japanese attitude towards death is quite different from ours; centuries of training has developed a fatalism which is beyond the Occidental imagination. But it is less known that this has produced in them real insensibility to risk and danger, which all the Western culture and practices introduced have not yet awakened. In many vocations this insensibility is more than offset, as in the case of automobile drivers, by unusual adroitness, but in aviators it must still be a handicap.

The airman's skill depends much upon his intuitive premonition of danger. He must sense the risk before it is encountered. Lacking this, Japanese pilots meet disaster oftener than the average Occidental, is my theory.

Now that—as I write—the first genuine international aero passenger service has been inaugurated by the Japanese, there will be opportunity to discover whether these airmen of Nippon are really mentally handicapped for flying. The regularity demanded to transport mail and passengers will be the real test. It will give an opportunity to obtain statistics to answer at least a part of the question.

The new air route for mail and passengers from Tokyo, via Osaka and Fukuoka, to Chosen (Korea) is served by what Japan considers the best foreign-made airplanes. The pilots are the pick of the civilian airmen. Several good landing grounds have been established along the route. A new international airport has been opened at Osaka. Everything is in favor of success, except the topographical and meteorological conditions of Japan.

Fujiyama, Nippon's sacred mount.

Success of the mail and passenger line will mean a turning point in the aeronautical history of the country, which, though it dates back to 1910, the year of the first Wright exhibition flights in the United States, has few brilliant lines. There are pages of slow progress and disaster.

In 1910, Captains Tokugawa and Hino made the first flight in Japan on a Bleriot monoplane and a Henry Farman biplane, respectively. From that time on little was done. The World War lent the nations of Europe marvellous progress in flying, while Japan remained obsolete. At the end of 1917 Japan had less than 30 old Maurice Farmans equipped with 70 to 100 horsepower Daimler motors.

The army and navy air organizations improved somewhat under the guidance of the French airmen headed by Colonel Faure, who came to Japan in January, 1918, and the British Air Mission, which remained from 1920 to 1921. The aircraft industries received a spurt at the same time, but only a few large firms have since built many machines or motors.

The Naval Air Force consists of 12 corps of which the one stationed at Kasumigaura is the largest. The supply of materials is in charge of the department of materials of the navy.

Civil aviation is under the direct control and superintendence of the aviation bureau of the department of communications. This bureau originally was directly under the war minister, but later was transferred to the supervision of the communications department.

The term of pilots' training is nine months. Candidates are selected among officers and non-commissioned officers, 22 to 23 years old. The navy and army aviation schools also undertake the edu-

[*Continued on page 89*]

Mobilization maneuvers in Osaka viewed from Ryan Monoplane of the Osaka Mainichi newspaper.

U. S. WEATHER BUREAU

LIGHTNING

by M. Luckiesh

Director Lightning research, National Lamp Works of General Electric Company.

LIGHTNING with its accompaniment of roaring thunder still momentarily terrifies human beings but the lightning-rod business is not a flourishing one. Property damage due to lightning and to the fires which often follow amounts in this country to only a few million dollars per year. The percentage of fire insurance officials living in houses without lightning-rods is the same as that of the public at large. Such equipment does not affect insurance rates. In fact, protection of ordinary buildings from lightning is no longer a live issue. Because of the rarity of lightning hits, the cost of lightning protection is overwhelmingly greater than the actual damage done.

In the matter of human beings killed and injured, again the facts are not disturbing. In this country less than five persons out of every million are struck by lightning annually. Many of these hits are due to human folly in taking refuge under isolated shelters—including trees—which are among the more liable to be struck. Therefore, earth-beings have found that, notwithstanding its terrifying flash and roar, lightning rarely damages them or their pocketbooks.

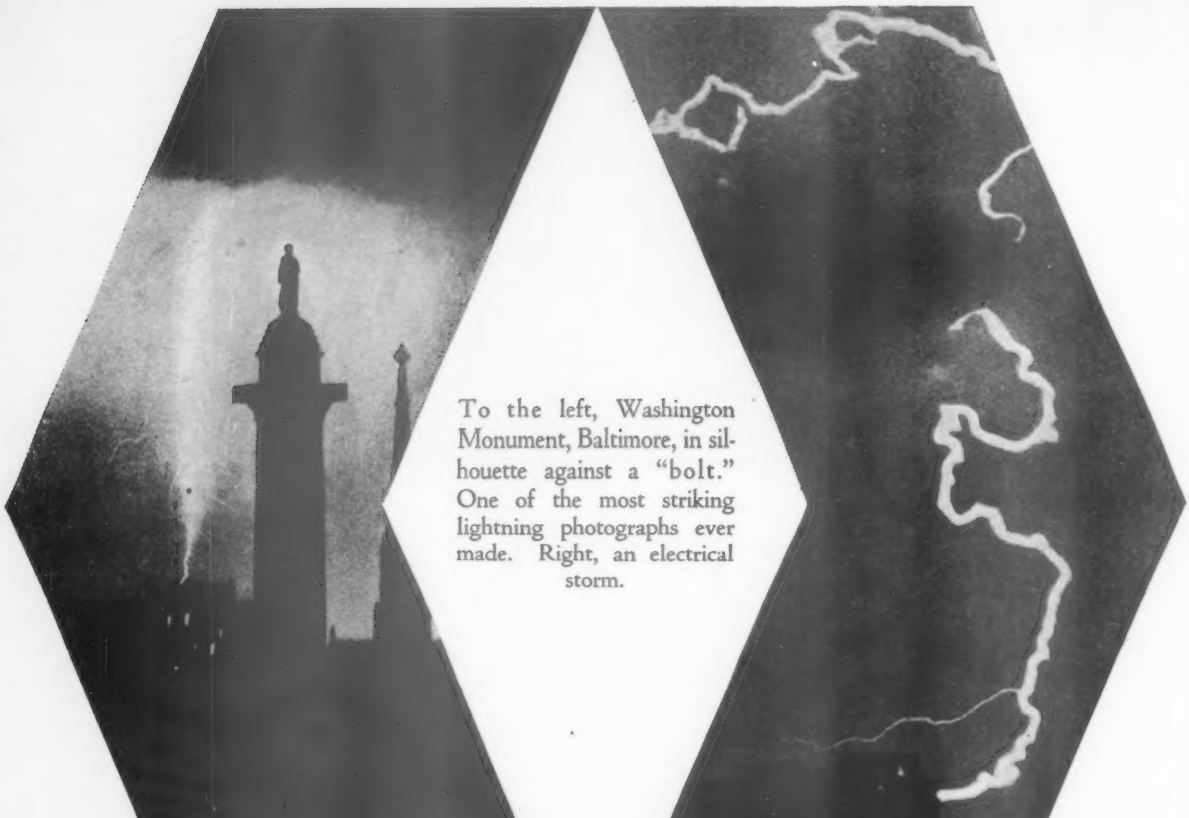
But mankind has taken to the air—lightning's source and playground. Somewhere up above, Jove makes and hurls his thunderbolts. The international balloon races start late on a sultry afternoon. In a few hours several balloons

have been harassed by thunderstorms and lightning. One or two are hit and disaster follows. Lightning appears to be dangerous to balloons. Zeppelins have often been reported to have been struck by lightning, but no disastrous results have been officially attributed to this terror of the sky.

The speed and maneuverability of airplanes keep them out of thunderstorms as a rule, but many have passed under, through, or close to such storms. Still, if there are any official records of airplanes being struck by lightning they have escaped the attention of the present writer and others interested in flying for many years. However, the subject is an important one now that mankind has definitely decided to travel by air. In fact, it is properly opened by the report that a T. A. T. airplane was recently the victim of a bolt of lightning over New Mexico.

Statistics may eventually prove that lightning is a more potential danger to aerial travelers than to persons remaining on the earth's surface. However, it is very safe to state that the chance of an airplane being struck by lightning is very small indeed. This assurance is gratifying but it does not eliminate the need for studying the problem nor does it dissipate interest in the subject.

A good deal is known of the habits of lightning discharges but naturally the subject has been studied from an earthly



To the left, Washington Monument, Baltimore, in silhouette against a "bolt." One of the most striking lightning photographs ever made. Right, an electrical storm.

UNDERWOOD & UNDERWOOD

viewpoint. Not all that is necessary is known in regard to the origin of the electrical charge which dissipates itself in such a flash followed by echoing thunder. With many gaps in our earthly knowledge pertaining to it, one is hard pressed to discuss it from a flying viewpoint. However, discussion leads to observations and these are sorely needed.

The source of the electrical charge in the air or in a cloud is commonly attributed to the friction caused by winds. During a spell of dry weather an enormous charge of electricity may accumulate. A cloud may be considered to be one plate of a huge condenser and another cloud or the earth corresponds to the other plate. When the voltage or potential difference becomes sufficient to break down this "condenser" the charge is dissipated by a bolt of lightning which in reality consists of many oscillations in a fraction of a second.

A photograph of lightning upon a rapidly moving photographic film, or obtained by rotating the camera very rapidly, proves this oscillatory character and also measures the elapsed time very readily. If the electric potential between two clouds or between a cloud and the earth is very close to the point of discharge, certainly an aircraft containing metal decreases the effective length of the air-path and would cause the discharge. If so, the lightning bolt would take a path of which the aircraft was a part. The result would be a direct hit. Even though there are many gaps in our knowledge of lightning this result seems inevitable.

This experiment is easily performed on a small scale. A spark-gap may be connected to a source of high voltage and it or the voltage may be so regulated that a disruptive discharge would take place if the gap were shortened slightly or the voltage increased. Then, if a small metallic object is introduced into the gap "lightning" takes place. Even a metallic object is unnecessary. By holding the flame of a lighted match beneath the gap the discharge will pass. The particles of carbon and the ions caused by the combustion will increase the conductivity sufficiently to cause the discharge. Rare as may be the chance of an aircraft passing at the proper time between two charged clouds or between a charged cloud and the earth, this *may* happen. And when it happens with the potential difference great enough, the aircraft may "set off" the lightning and thus become a part of the latter's crooked path.

In 1751, Benjamin Franklin proved that lightning was a huge electric spark. However, little was added to that knowledge until near the beginning of the present century. Much or most of the atmospheric electricity is believed to be produced by simple friction. It has been shown that a powerful spray of condensed steam driven against a surface of water produces an electric charge. In any event rain conducts to the earth much of the atmospheric electricity which has accumulated during dry weather. Doubtless, there are other factors.

For example, it is known that invi-

[*Continued on page 74*]

The Magic Carpet of Business

by
B. G. Dahlberg†

IT was a little more than two years ago that I purchased my first airplane, a Stinson-Detroiter,* and since that time the log kept by my pilot shows that we have covered more than 284,000 miles. This was the distance when we last checked the total and by now 300,000 miles is more nearly the correct figure.

Most of this flying was to speed up my traveling between the widely separated points of the offices, factories and plantations of the Dahlberg Sugar Cane Industries. For example, the mill and plantations of The Southern Sugar Company are located at Clewiston, Florida, in the southern central part of the state, midway between Palm Beach and Fort Myers. The mill of The Celotex Company, where we manufacture a semi-rigid building board from bagasse, the waste fibre of the cane after the extraction of the sugar, is located at Marrero, Louisiana, just across the river from New Orleans.

Also, in the sugar cane district of Louisiana are located the plantations and mills of The South Coast and Cypremort Companies, while offices of all the companies are in Chicago. The main office of The Southern Sugar Company is in New York City, and, as the financial center of the country, it is there too that the Dahlberg Corporation of America, the holding company for these industries, originated.

With this picture in mind and considering the length of time required for ordinary rail travel between these points, it is easy to see the time saving value of flying. To my mind the airplane will mean as much to the future of American industry as the telegraph and long-distance telephone have in the past.

In making the long jumps I follow the plan used by the T.A.T. in the transcontinental service recently inaugurated by Col. Lindbergh. When it is necessary for me to go from New York to Clewiston, I take the night train as far as Fayetteville, North Carolina. My pilot, George Pomeroy, has gone on in advance and is waiting there with the ship.

From Fayetteville we generally fly to Jacksonville, stop for lunch and take on fuel, and then on down to Palm Beach or over direct to the mill at Clewiston.

* Mr. Dahlberg has since added others to his fleet.

† President Celotex Co., Dahlberg & Co., Clewiston Co., Southern Sugar Co., South Coast Co., Dahlberg Corp. of America, Florida Sugar and Cypremort Cos.

Bror G. Dahlberg, with his pilot, George Pomeroy, and Fairchild cabin job.

Another view with the efficient Wasp-motored Fairchild forming the back drop.

By train this trip would take two days. From Jacksonville to Clewiston alone is a long sixteen hour train ride, which distance we fly in around three hours.

Chicago to Florida, it is practically the same procedure except that I take the night train to Millington Field, near Memphis, Tennessee, where we get an early morning start and fly to Florida, saving a day's travel. At Clewiston we have our own landing field and hangar. Recently we purchased a Curtiss Robin plane for use by the officials of the company located in Clewiston. A daily check on the activities of planting, harvesting and preparing additional acreage in this vast territory in the Everglades, owned by The Southern Sugar Company, is made by airplane. Ordinarily it would take a month for a man on horseback to check these conditions. But this is another story.*

From Jacksonville to New Orleans is just a nice hop of five hours and I am at the mill of The Celotex Company. Then, perhaps, back to Chicago the next day.

If it is necessary for me to visit our offices on the west coast I take the night train from Chicago to Kansas City and then fly on to El Paso, Texas, and from there on to Los Angeles. Or, if the weather is right, we may go by way of Omaha, Nebraska; Cheyenne, Wyoming and Salt Lake City. In every instance my pilot goes on ahead while I transact the business in hand. I then get my night's sleep on the Pullman and am ready for a full day's flight and work.

After the novelty of flying has worn off and one settles down to it as a matter of business routine, it's just about like regular steamship travel. Sometimes the air is a bit bumpy and then one has to be a good sailor. But for the most part it is swift, clean and even a bit exhilarating.

For the past year I have been using a Fairchild cabin job that I originally purchased to equip an exploring party headed by Dr. E. W. Brandes of the Department of Agriculture which penetrated into the wilds of New Guinea in search of new species of sugar cane. As a result of this expedition more than 100 varieties, including the Saccharum Robustrum species, were brought back to America for use in the government experiment station adjoining our properties at Canal Point, Florida.

Sugar cane is not grown from seed but a section of each stalk between the joints is planted in the earth. This made it necessary to bring back live cane that would germinate. Without the airplane, it would have been a physical impossibility to have procured the new species from the unexplored regions of New Guinea, which country is said to have been the original home of cane, inasmuch as once the cane had been procured it would have withered and died on the long trek back to civilization.

The cabin of this plane, which is called "The Celotex," is arranged so that I can work with my secretary, going over the mail and papers on hand and having them all cleaned up by the time we finish our "hop." At other times, my secretary may follow by train and I work alone, read or take a nap as the case may be.

I do not believe in taking any undue risks in flying and my pilot always receives the weather reports ahead on the route we are to cover. However, when one is flying constantly, some bad weather must be expected and then it is that the staunchness of the ship and the skill of the pilot are important considerations.

In this connection, I believe that one of the greatest factors in safety is the building and maintenance of emergency landing fields. To me it is one of the interesting signs of the growing air consciousness of the country that such fields are springing up like the proverbial mushroom. Naturally my business takes me frequently over the same routes and in the comparatively short time that I have been flying it is amazing how the number of these fields has increased.

For the business man making long trips it is also important that his pilot should be thoroughly familiar with the country over which he is to fly. Then if an emergency landing is necessary he will know how much time to figure on and where to land. I believe thoroughly that a business man cannot be too careful in the selection of his pilot and the selection of his ship. My pilot is one of the veterans in the business of flying, having gained his first instruction under the French during the war and later flying the air mail and regular commercial work.

Often during the day's flying we are able to make several stops, transact the business on hand and be on our way to our final destination. The growing facilities of the larger airports are doing much to help in this regard with their waiting rooms and restaurants. I may wire on ahead for a man to meet me at the airport, discuss our business there and within a half an hour be in the air on our way to the next town. At lunch time we stop and eat or if we are in a hurry we take our lunch with us and eat en route.

I would not venture to say just how much the time saving of air travel has increased my own productive efficiency; but it is high. In fact, after having used an airplane for business traveling, it would be as difficult to do without it as to go back to the horse and buggy after the automobile.

[*Continued on page 109*]

*** Story on Everglades will follow in an early issue.**

Fliers Who Follow the Sun

by George H. Dacy

Sportsmen, like migrating birds, now follow the sun.

OUR ever increasing tourist procession composed of motoring "robins" that flit southward with the sun when seasonal temperatures signal the approach of winter is now rivaled by a small band of amateur birdmen who make similar annual migrations.

Following close in the wake of the real migratory birds that sense the coming of cold weather and dodge it by southerly flight, prominent American sportsmen cruise cloudland with gasoline wings, their destination being our southernmost peninsula—spacious Florida.

Soaring through skyland at terrific speed, millionaires laugh at the threats of Jack Frost and Boreas as they pilot their airplanes toward the American tropics where June-in-January weather is a sort of year-around occurrence. Travel through the upper air is thus adding another thrilling chapter to the history of New World transportation.

From Detroit, Chicago, New York, Cleveland, St. Louis, and other American cities, sportsmen journey through the ocean of air to sunny Southland where ideal flying weather prevails during the reign of King Winter throughout the snowflake zone. Just as leading golfers, tennis champions, swimmers, baseball players, polo players and other lovers of outdoor sports shove off for Florida when the weatherman temporarily banishes such amusements from northern settings, a mounting list of amateur aviators is also forming the habit of simulating the birds that follow the sun.

South Florida is the mecca of these air-travelers who are ushering in a new and novel era of pleasure jaunting from here to there and everywhere. Miami, winter resort capital of northern society, is a leading center of Dixie flying where superb aviational conditions are provided throughout the year. From this pleasure, the visiting fliers can rove to Nassau, Bimini, Cuba, South America and other tropical destinations assured that winter's vicissitudes will neither interrupt nor mar their trips.

Gar Wood, impeccable power boat champion from Detroit, maintains a beautiful winter home at Miami Beach and frequently flits from North to South, or reverse, in his sturdy amphibian plane, Kin Jockety. During his winter vacation, Mr. Wood pilots his pleasure plane regularly above the multihued waters of Biscayne Bay, the Gulf Stream and the great Atlantic. Last spring, Gar Wood drove his sterling speedboat, Miss America VII, to a new world's record in Indian Creek, just back of his Miami Beach estate during one of the intervals between his cruises on high. In six speed trials over the accurately measured one mile course, both with and against wind and tide, Mr. Wood set a new average speed record of 93.123 miles per hour. No other racing boat under the most favorable conditions has been able to eclipse a gait of 80 miles an hour.

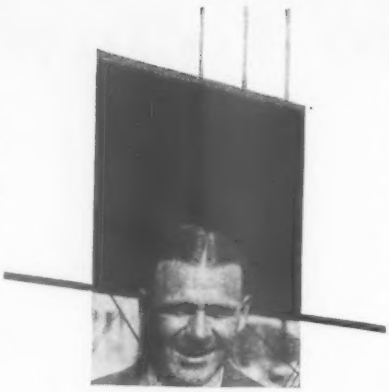
A disciple of speed both on land and

Just in from the Frozen North after a glorious trip.

water, it was only logical that Mr. Wood would react positively to the lure of swift flight through the kingdom of the sky. In record time under skilled tutelage, he mastered the fundamentals of flying and shortly began solo ventures as pilot of Kin Jockety into the upper atmosphere. This seasoned sportsman is now an enthusiastic advocate of air travel. Aviation speedsters who delight in establishing new flying records welcome Gar Wood to their ranks. If, potentially, he performs as successfully in cloudland as he has formerly in piloting his record power boats, the tales of his flying exploits will eventually be told around the world.

John D. Hertz, who accumulated a fortune in the taxicab business in Chicago, is another American millionaire who maintains a palatial winter home at Miami Beach and who travels via the atmosphere wherever he goes in his Sikorsky amphibian plane. The colors of the Hertz stable of thoroughbreds have been at the van in many national and international running races during recent years and have entrenched both Mr. and Mrs. Hertz as outstanding participants in the sport of kings. Their interest and ardor in aviation are almost as great.

Joseph Medill Patterson, owner of the Chicago Tribune and Liberty Magazine, often is accompanied by his daughter in their privately owned plane. They are also numbered among the air-minded tourists who last season shortened the trip from the frozen North to summery South by way of the upper air. After an enjoyable sojourn in Miami, the Pattersons traversed the notable "Lindbergh circle," a delightful air voyage in regions where tropical temperatures obtain during the time when heavy overcoats, furs and galoshes are the order of the day "back home."



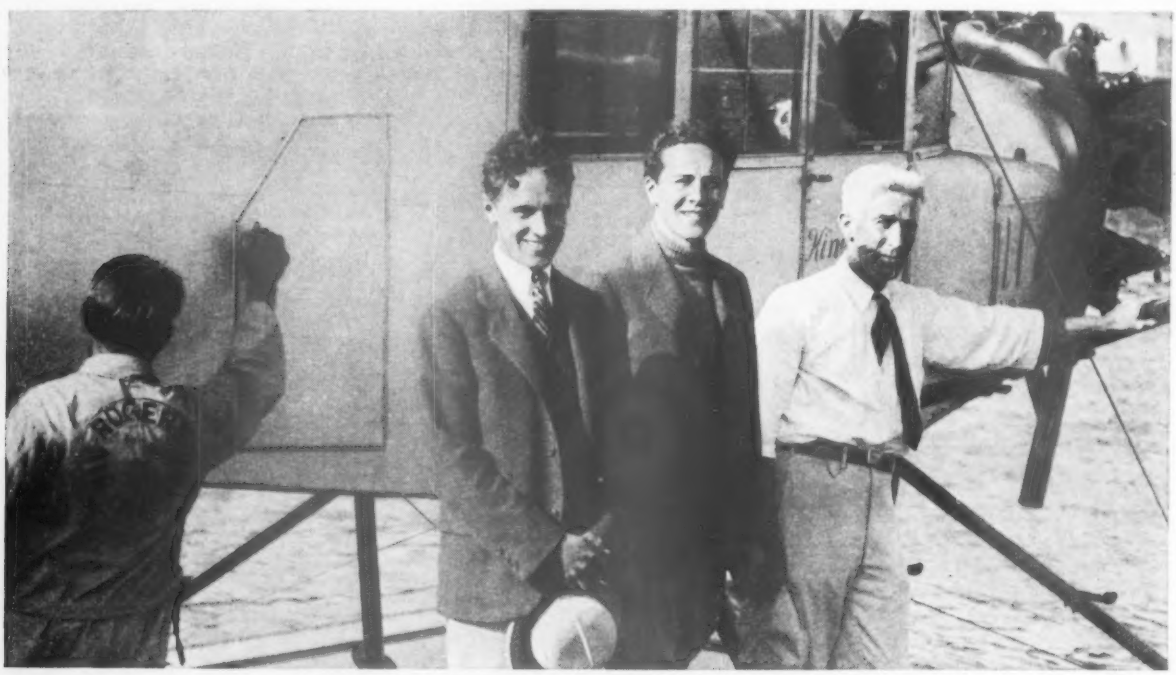
Harry Rogers, adept angler and skilled pilot, uses his home-constructed amphibian for jaunts to the Deep Seas Fishing grounds. He anchors his amphibian, fishing directly from the "Parked" plane.

The rhythmic roar of incoming and outgoing planes in the latitude of beautiful Biscayne Bay has reached such proportions at Miami that yachtsmen have objected and requested the removal of waterside landing fields to sites farther away from the center of things. This astonishing condition illustrates aptly the popularity which aeronautics has attained in South Florida. When the comings and goings of aircraft are so numerous as to disturb the rest and recreation of wealthy yachtsmen—many of whom also own and operate their favorite flying machines—aviation has been accepted on a large scale, as a modern means of pleasure transportation.

NEW angles in aviation in South Florida include not only the use of modern flying machines for extraordinary fishing and hunting trips, but also for unique social and scientific purposes. Bridge and tea parties by airplane one mile above azure seas and tropical terrain were inaugurated in Miami during the last tourist season. The story of the first flying bridge parties was recounted in France, England, Italy, Germany and other European countries where flying has attracted the ardent attention of social leaders during the last few years.

Mrs. James Gilman, wife of a bank president, and herself president of the South Florida Junior League, was the originator of this innovation in aviation. This clever hostess chartered a Ford trimotored plane for an afternoon tea and bridge party. Naturally her guests were thrilled at the idea of going up in

[*Continued on page 60*]



Raymond and Russell Firestone, Gar Wood, Mr. Wood's plane, the Kin Jockety, in the background. Each of these three, prominent in other branches of sport, have taken to flying with great enthusiasm.

NEW AIR CORPS SALVAGE TRUCK

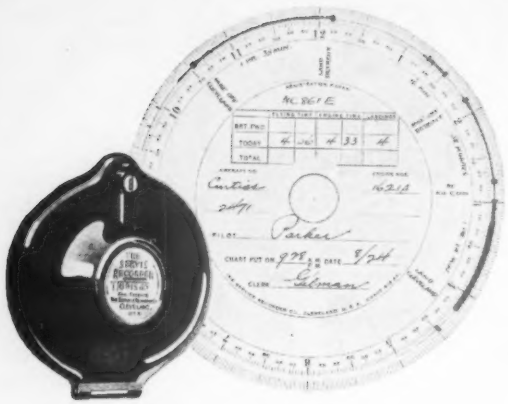
THIS truck is designed to meet the new conditions of the modern air field.

A NEW wrecking or salvage truck has recently been delivered at Wright Field, Dayton, Ohio, for service testing. This will be used for the transportation of new and wrecked airplanes, for carrying large quantities of oil and gasoline in drums, for loading heavy equipment, or changing engines. The body is of sufficient size to permit hauling a complete airplane of the pursuit or observation type, or either the fuselage or wings of larger planes. A hand-operated crane is provided with a capacity of two tons. The truck is 18 feet long and 7 feet wide with a capacity of five tons.

A six-wheel drive chassis has been selected for it because it will be required to operate on unlimited cross-country missions in reaching the scene of crashes and with this drive the truck will have the ability to negotiate the terrain encountered in cross-country operation, and for the further reason that its large area of ground contact permits operation on the airdrome with a minimum amount of damage due to the wheels sinking.

The body is of platform type with removable posts and wing racks. The crane is provided with a chain hoist and is hand-operated. It is so designed that it may be lowered when not in use. There are three floodlights for night work, two mounted on the outside, and one on the inside. The inside light is portable and provided with fifty feet of extension cord. Ample space is provided for carrying tools, tackle, and other necessary equipment.

The chassis is a Coleman six-wheeled type, provided with 42 by 9 pneumatic tires all around. The old large trucks have always been hard to steer. This drives easily through all six wheels. Air brakes connect with the four rear wheels and an emergency hand brake operates on the drive shaft. The crane is raised into position by pulling back upon it until the pins on the side channels can be inserted through the boom fittings which slide inside the channels. The cables are then placed into position over the pulleys on the tops of the two rear body posts. The boom is then raised into position by turning either crank on the windlass. This truck will form an important piece of field equipment for the air corps under either war or peacetime conditions.



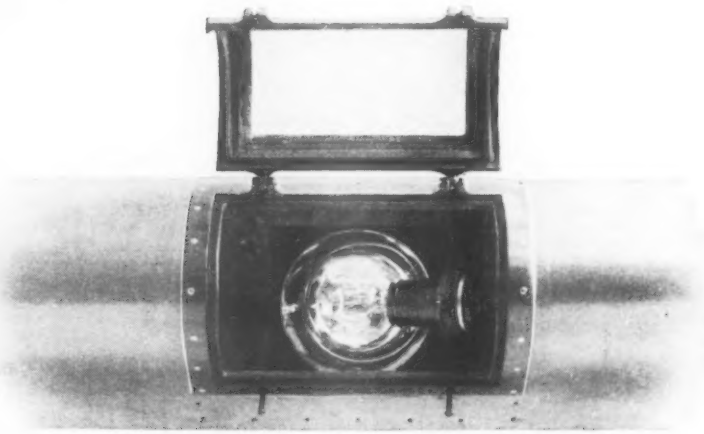
SOME NEW

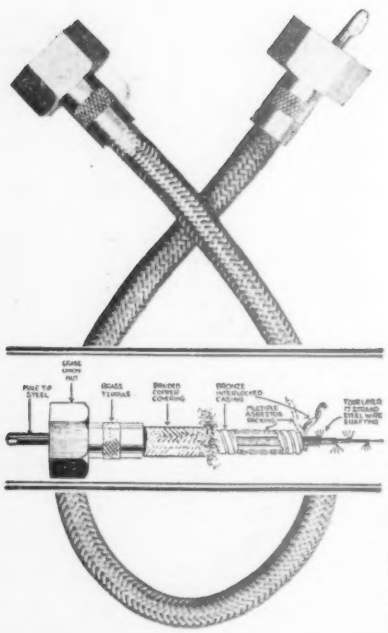
THE SERVIS RECORDER is a small and simple precision device which automatically writes a complete log of the ship. It is a completely independent, self-contained unit operated by its own clock mechanism, and is not connected with the motor or other mechanism.

The only operation required is rewinding of clock and insertion of fresh chart each day.

TO THE RIGHT IS the New Fairchild streamlined landing light.

It is set in an opening in the wing, 11 inches across, eight inches deep and 10 inches high, at its rear or highest point. It is light in weight. A 420 watt lamp is used, and the device is fitted with effective shock absorbers. All parts are easily accessible.



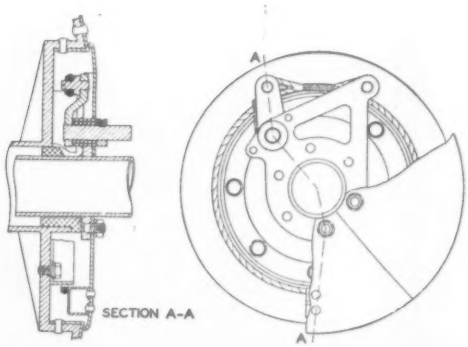


THE WILHART AIRPLANE BRAKE is low in price and simply constructed. It is light in weight yet rugged. The design allows for the lubrication of the friction elements resulting in what is claimed to be very smooth action.

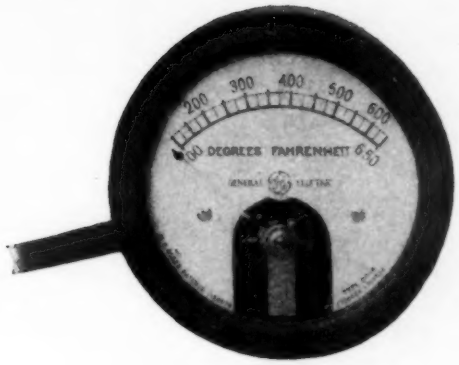
The cable assembly is to standard airplane specifications. All steel construction and the mechanism is easily inspected and serviced.

THE TACHOMETER DRIVE SHAFT to the left is now offered by Consolidated Instrument Co.

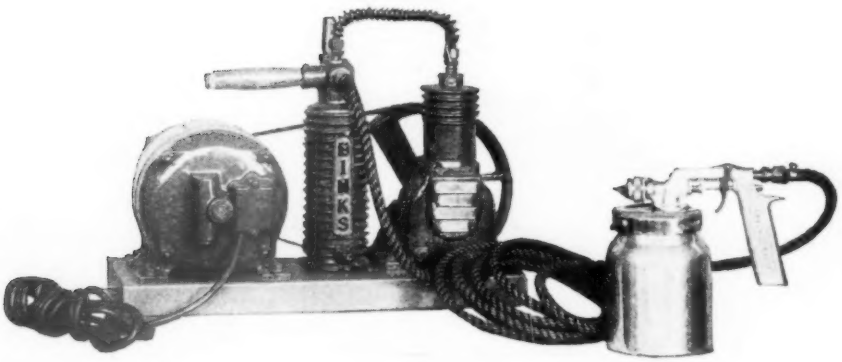
Superiority is claimed for the new shafting and great durability and flexibility for the cable. The light casing is strong with no japanning or lacquer to scale off.



EQUIPMENT



PICTURED TO THE RIGHT is the new General Electric indicator for engines. This device is a cold-junction, temperature compensated instrument, consisting of a thermocouple with its leads and a remote indicating instrument calibrated to read engine heat. When mounted in the cylinder heads and walls of aircraft engines, it will indicate the engine temperature at any desired remote point.

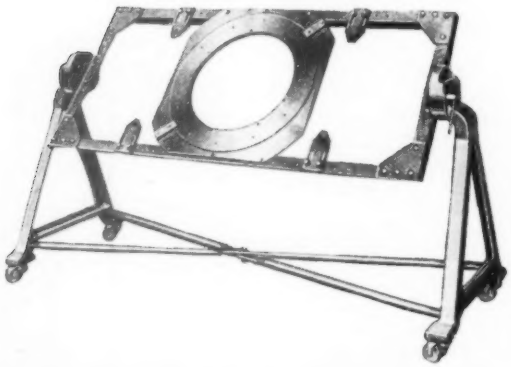


OF INTEREST TO MANUFACTURERS and owners alike is the Binks New Hurly Unit for general utility paint spray lacquering work, finishing, etc.

It is a complete unit, operated electrically, soundly made and can be used by tyro or expert.

THE LIPE AIRPLANE MOTOR STAND, below, is intended as a universal motor stand for engines of all types, and in sizes varying from 60 to 600 h.p.

The frame is adjustable for width and length and can be freely revolved in either direction, and locked securely in desired position by a hand clamp. Diagonal leg braces are mounted on double swivel casters with ball bearings.



TO THE RIGHT IS SHOWN a Centrifugal water separator, new equipment of Bowser Aviation Fueling Pit.

Gasoline flowing into it is swirled forcefully and the water expelled into a chamber provided. The action is similar to that of a cream separator.

TRANSOCEANIC ROUTE PLANNED

A WIDE and far reaching project for transoceanic transportation to connect the principal continents is under way, according to recent advices received.

The plan is being promoted by Warren Scholl, industrial engineer of Chicago, who is now in Canada for that purpose.

Mr. Scholl states in a letter that a Canadian, British and American corporation with an aggregate capital of $22,000,000 is in various stages of development for this purpose.

It is planned to develop the Northern Route (as indicated on the map) first with suitable landing fields every few hundred miles together with fuel caches. These are to be located between the major airports.

This project if carried to successful completion will be easily the most important aeronautical development in the transport field during the past few years.

It is planned to embrace a mail, express and passenger transport service.

It is planned to have the service ready for start in the spring of 1931.

A lecture tour campaign is contemplated with the object of prompt publicity, to acquaint business men and others with the use of this service.

It is estimated by the promoter that the preliminary expenses of organization and equipment will be $12,101,000.

Passenger rates to be charged will be $1,800 for the round trip from New York, Chicago, or Winnipeg, to London, including meals and accommodations.

It is planned to use planes of all-metal construction, equipped for landing on ice, land or water.

Experiments, it is stated, will be shortly under way to determine the best available types of equipment for this service.

AERONAUTICS is not acquainted with the precise financial background of this ambitious scheme, but believes it to be a sound plan. We will be glad to send such information as we have on hand to those interested.

AERODYNAMICS

by

Alexander Klemin

Professor of Aerodynamics, College of Engineering, New York University

Article 13 ▲ ▲ ▲ ▲ ▲

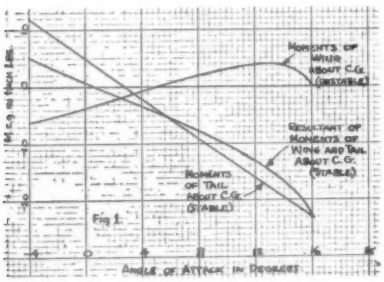
Longitudinal Stability

Use of the Wind Tunnel in Studying Longitudinal Stability

IT is difficult to obtain absolutely accurate results regarding efficiency in the wind tunnel. The wind tunnel is useful, however, in giving comparative values of efficiency, and is reliable as regards longitudinal stability. So that our readers may be able to interpret wind tunnel test reports, we shall continue the study of the stability of our airplane on a wind tunnel scale.

The monoplane described in the previous article had 10 foot chord, and 60 foot span. A wind tunnel model of 1/20th scale with chord of 6 inches and span of 36 inches would be quite convenient. A wind tunnel speed of 60 miles per hour will be assumed in our calculations.

As stated in the previous article, the center of gravity is taken at 35 per cent of the chord or 21 inches from the leading edge. The arm of the tail surfaces is 18 inches on the model, and their area is 32.4 square inches.


Moments of Wing about C.G. (Unstable)
Resultant of Moments of Wing and Tail about C.G. (Stable)
Moments of Tail about C.G. (Stable)
Fig 1.
Angle of Attack in Degrees

With these assumptions, calculations as in Example 1, can be made for the moments about the center of gravity of the wing alone. Plotted in Figure 1, the curve of the wing moments is seen to be unstable; at large angles of incidence there is a stalling moment, and at small angles of incidence a diving moment.

In Example 2 the tail moments are calculated and also plotted in Fig. 1. The tail moments tend to give stability, since they are diving moments at high angles of incidence and stalling moments at low angles of incidence.

When the moments due to the wing and those due to the tail surfaces are added together, the resultant curve, as shown in Figure 1, is stable.

We come to this conclusion that for the ordinary type of wing such as the Clark Y, the wing gives an unstable moment curve, which can be overcome by the stabilizing effect of the tail surfaces.

Example 1—Method of Calculating Wing Moments

If the Clark Y wing is at 4° incidence the center of pressure is at 36.5% of the chord. Therefore the distance between c. p. and c. g. is 1.5% of the chord or .09 inches. Neglecting effect of drag on moments and taking lift only into account:

Lift = Ky AV^2 = .00179 × 1.5 × 3600^2 = 9.65 lbs.

Arm of lift = —.09 × cos 4° = —.0895 inches.

Moment = .0895 × 9.65 = —.865 inch lbs.

Moment is negative since c. p. is in back of c. g.

Example 2—Method of Calculating Tail Moments

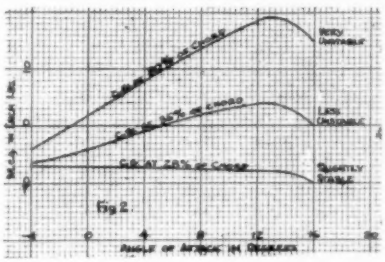
Angle of downwash =
1980 Ky + 0.25.
1980 × .00179 + 0.25.
3.80°.

Angle of attack of the tail =
angle of attack of wing + .62 (original setting of tail to wing) — 3.80.
4.62 — 3.80 = .82°.
Ky of tail at .82 degrees = .00017.
Lift on tail = .00017 × .225 × 3600 = .138163.
Arm of tail = 18".
Moment due to tail = 18 × .138 cos A° = 2.45 in. lbs.

Effect of Center of Gravity Position

IN Fig. 2, the wing moments are shown recalculated for two other positions of the center of gravity: namely, 28 and 50 per cent of the wing chord.

When the center of gravity is far forward, there is nose heaviness, but no instability for the wing alone, since the moment curve slopes down from left to right.



Curves of wing moments about C.G.

When the center of gravity is far back, the instability of the wing moment is very large, since the curve slopes markedly upwards from left to right.

It follows that it is very much harder to make an airplane stable, when the center of gravity is far back.

An airplane in which the passenger load, or mail or freight is not disposed at the center of gravity may therefore be quite stable when fully loaded, and instable when lightly loaded or vice-versa.

Practical operators should therefore pay considerable attention to the balance of the plane. At the Croydon Aerodrome in London, all passenger machines are carefully weighed for c. g. position before they are allowed to leave the field.

A rough practical rule, frequently used in design is that the center of gravity should be at 30 per cent of the wing chord.

Effect of Vertical Position of Center of Gravity

THE effect of the vertical position of the center of gravity on the longitudinal stability is comparatively slight.

Suppose the center of gravity is at 30 per cent from the leading edge, but far below the chord as shown in Fig. 3. At 1 degree incidence the center of pressure is at 42.5 per cent of the chord. The

lift under these conditions is exercising an unstable during moment, the drag a stabilizing, stalling moment. But since the drag is much smaller than the lift,

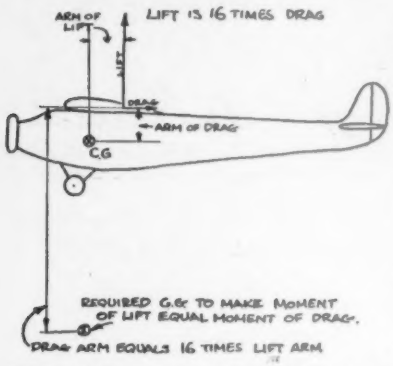
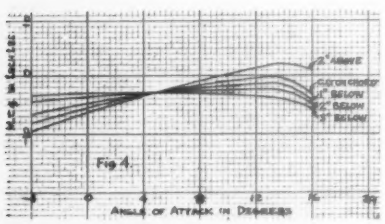

ARM OF LIFT
LIFT IS 16 TIMES DRAG
LIFT
DRAG
ARM OF DRAG
C.G
REQUIRED C.G. TO MAKE MOMENT OF LIFT EQUAL MOMENT OF DRAG.
DRAG ARM EQUALS 16 TIMES LIFT ARM

Fig. 3. Center of gravity at 30% of chord but below wing. *Note:* Lift gives diving moment. Drag gives stalling moment.

the center of gravity would have to be placed so far below the wing to secure stability as to give a totally impractical airplane.

Nevertheless placing the center of gravity low down does improve the stability somewhat as shown by the curves of Figure 4, where moments for wing alone are calculated for a fixed position along the chord. As the distance below the chord increases, so the unstable slope of the wing moment diminishes.



Curves of wing moments about C.G. at 30% of chord from leading edge.

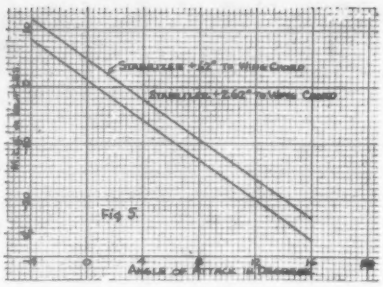
Conversely if the center of gravity is placed above the wing, the instability of the wing moment will increase.

It follows from this that a low wing monoplane of design otherwise similar to that of a high wing monoplane will require a larger area of tail surfaces.

Changing Trim by Changing Stabilizer Setting

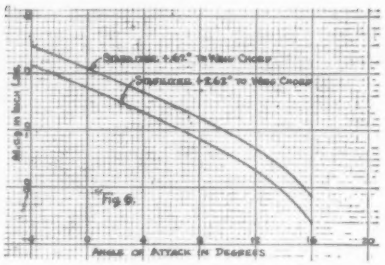
CHANGING the stabilizer setting does not change the properties of the tail surfaces, but merely shifts the curve with relation to the angle of incidence.

For example, if for the case illustrated by Figure 1, the stabilizer leading edge is raised so as to give the stabilizer 2 degrees more incidence, then the tail moment curve is simply shifted 2 degrees to the left, but remains parallel to itself (see Fig. 5).



Tail moment curves for different stabilizer settings.

The resultant moment curve now passes through the zero point at a smaller angle of incidence, but its slope remains unchanged (see Fig. 6).



Moment curves of complete model for different stabilizer settings.

Therefore changing the stabilizer setting only affects the trim, but not the stability.

A Defect in Stability Cannot Be Removed by Changing Stabilizer Setting

IF the stabilizer leading edge is raised, it will carry a lesser down load, and that is why the plane trims at a lesser angle of incidence. In other words raising the leading edge of the stabilizer will remove tail heaviness.

Conversely lowering the leading edge of the stabilizer will increase the down load on the stabilizer, and trim the plane at a higher angle of incidence. In other words lowering the leading edge of the stabilizer will remove nose heaviness.

The adjustable stabilizer is very convenient where flights are to be made with various positions of the load, or at various altitudes, but if the center of gravity is so far back that a plane approaches instability, then the instability will remain no matter what the setting of the stabilizer may be.

Slipstream Effects and Line of Thrust Position

IF, as in most modern airplanes, the center of gravity is placed well forward, say at 30 per cent of the wing chord, the center of pressure is behind the center of gravity almost through the entire flight range, and the tail surfaces are carrying a downward load accordingly.

An airplane propeller develops its thrust by "pushing" on the air and accelerating it as it passes through the propeller disk. Therefore the velocity of the air in the slipstream of the propeller is greater than the speed of the airplane as a whole.

Where the tail surfaces are in the slipstream, they will for the same flight speed be in an airstream of greater velocity with "power on" than with "power off," and will experience a greater downward force with power on than with power off.

Accordingly, if a plane is trimmed, power off, for a certain flight speed, it is likely to be tail heavy at the same speed with power on.

Conversely, if a plane is trimmed for power on at a certain flight speed, it is likely to be nose heavy at the same speed with power off.

The above remarks are almost certain to be true when the line of thrust passes through the center of gravity of the airplane.

When the line of thrust does not pass through the center of gravity the problem becomes a little more complicated.

Let us take the case of a high wing monoplane, with gasoline tank in the wing, a high position of the center of gravity and from considerations of the pilot's vision a comparatively low thrust line, as illustrated in Figure 7.

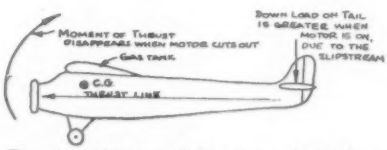

MOMENT OF THRUST DISAPPEARS WHEN MOTOR CUTS OUT
GAS TANK
C.G.
THRUST LINE
DOWN LOAD ON TAIL IS GREATER WHEN MOTOR IS ON, DUE TO THE SLIPSTREAM

Fig. 7. Showing C.G. above thrust line. *Note:* When motor cuts out plane tends to nose down.

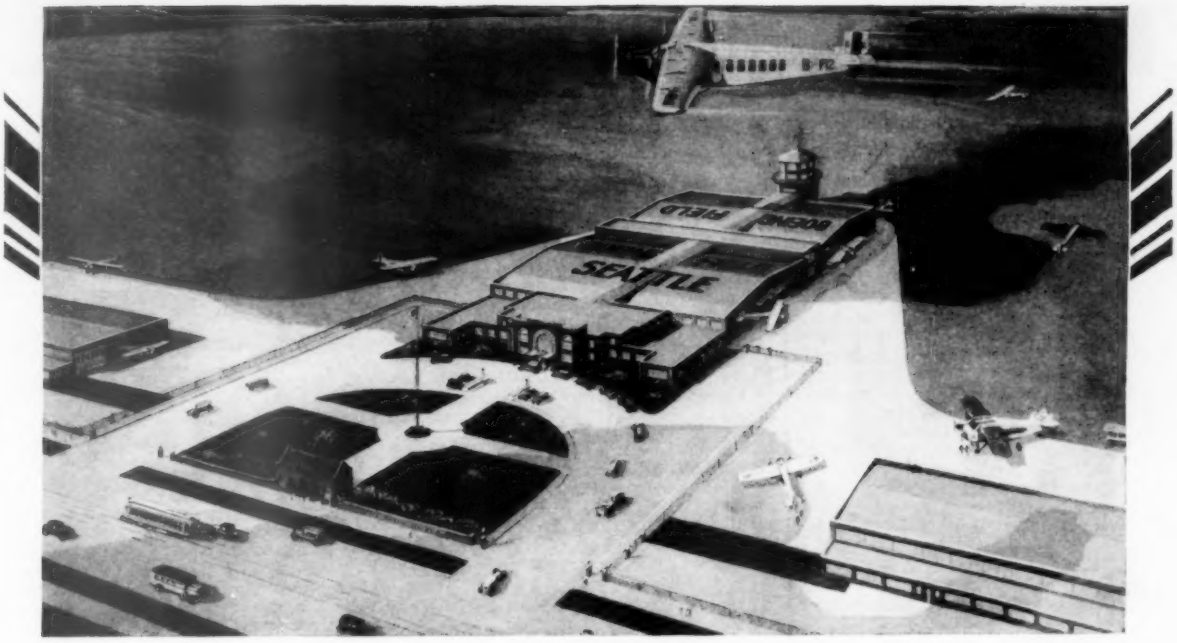
Suppose that by stabilizer adjustment the plane is in balance with power on, and the engine is suddenly shut off or fails.

The slipstream disappears and the downward force on the tail surfaces diminishes. There is therefore a tendency for the plane to nose down. Simultaneously the moment of the thrust, which evidently exercised a stalling moment about the center of gravity, disappears. This is another reason for the plane to nose down.

In this case the balance "power off" and "power on" is quite different, and pilots will complain rightly that the ship tends to go into too steep a dive when the power is shut off.

Now let us take the case of a low wing monoplane as in Figure 8 where the thrust line is above the center of gravity. In this case when the engine is suddenly switched off, there is as before a lesser down load on the tail surfaces, but

[*Continued on page 64*]



BOEING AIRPORT

A terminal for air traffic passengers now under construction at Seattle, Washington.

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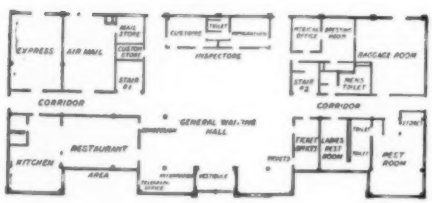

First Floor Plan

THIS Airport will be the first in the United States, and probably in the world, at which air passenger traffic will be handled on the same general principles as at railroad passenger terminals.

In the passenger depot of the new airport, the traffic, completely under control at all times, will pass from the street door through passenger concourses directly into the cabins of the planes without once leaving cover.

The new port will ultimately cost $1,500,000, exclusive of the 160-acre site.

The depot will be provided with all the conveniences for travelers found at a first-class railroad station—restaurant, concessions, rest rooms and other facilities. Austin Co. are the builders.

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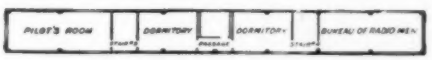

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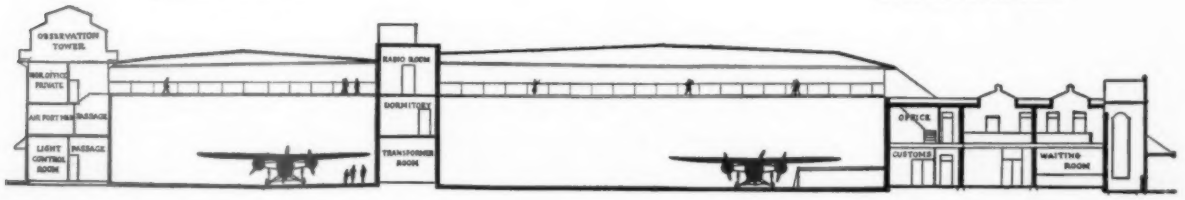
Second Floor Plan



THEY TELL US—

A Forum of Comment, Criticism and Remarks

Colorado Springs, Colo.—I think such legislation would be a mistake. The entire industry is so new that experimental laws would tend to throttle the free development of the art.

For instance the Alexander Aircraft Co. has this year introduced the Bullet, a small cabin ship that is faster and cheaper to operate than those now in use. If an air line operator has a fleet of older type ships on a line and an exclusive permit to operate that line, a competitor can't get in without a lot of political pull or without unwinding much red tape to prove that his equipment is better.

J. DON ALEXANDER
—ALEXANDER AIRCRAFT CO.

New York City, Aug. 8.—I consider the passage of a law granting a monopoly in the operation of any air route would be extremely unwise for many years to come.

With the grant of any such monopoly franchise there would inevitably come a regulation of rates, services, equipment and schedules. The business is far too young to be able to survive regulation. There are very few companies who have demonstrated their ability to serve the public adequately between our important cities. It seems to me that there should be the most complete opportunity for competition. The companies which perform the service best and most economically, and are most wisely guided, will survive, but any legislation that would prevent the development of healthy competition would only tend to continue in operation inefficient services.

The grant of such franchises would be very largely in political control.

What the business needs most now is to be let alone so far as regulatory statutes are concerned.

The situation is entirely different from that of the railroads which obtain very large privileges from the Government in exchange for submission to regulation. The same is true with motor bus transportation, which could not exist at all if it were not for the indirect subsidy of many millions of dollars spent by Government authorities in providing and maintaining modern highways. The air lines get no such assistance.

I have no doubt the representative who has written you is trying to be helpful, and that he has in his mind some specific instance of where competitive lines are in danger of bankrupting each other. It is always to attempt to enact a whole general legislative program because of scattered instances of destructive competition.

C. W. CUTHELL
—CUTHELL, HOTCHKISS & MILLS

Chicago, Ill., Aug. 5.—The purpose and intent of this legislation would be excellent and would have a stabilizing effect on the industry. I do not like the way the proposition is worded but think it would simplify the matter if the Congress would simply pass a bill authorizing the extension of the jurisdiction of the Interstate Commerce Commission to include interstate air commerce.

Then the existing air lines would have to give service deemed adequate by the Interstate Commerce Commission, and utilize equipment which would also have to be satisfactory. In the event they complied with these requirements, there would naturally be issued to them a certificate of convenience and necessity such as is enjoyed by other common carriers.

It is my understanding that one of the large groups in aviation are very desirous of obtaining the benefits enumerated above without assuming the obligations as to the adequate service and rates, and it may be that they have inspired the Congressman mentioned in your letter. If this safeguard is not thrown around the legislation the people would suffer the existence of virtual monopolies not under control.

P. G. KEMP, PRES.
—CENTRAL AIR TERMINAL COMPANY

New York City, Aug. 5.—I have not the time at the moment to give adequate consideration to your suggestion. I have in mind that we seem as a people to be a nation of law writers; that is to say, our tendency is to attempt the cure of all evils by legislation. Many statutes when written seem superficially, at least, to be the solution for the particular ill they were designed to cure. Frequently, however, as experience shows, we jump from the frying pan into the fire.

It occurs to me that the enactment of such a statute as you propose might be the basis for the establishment of many air routes inadequately financed and indifferently operated, the sole objective in each case being the "staking of a claim." As the situation is now, air operating companies under the spur of competition which is, generally speaking, quite unfettered, are concerning themselves with developing the good will of the public by the sufficiency and merit of their operations.

Should we secure statutory protection it might well be that operators would be forced to turn into a new field to protect their interests. I refer to the field of legislation, politics, legal proceedings, expert witnesses, etc., all of which might develop into so many wire entanglements in the way of real progress.

Your suggestion, however, is worth real study.

JOHN F. O'RYAN, PRES.
—COLONIAL WESTERN AIRWAYS

New York City, Aug. 6.—I think we are safe in assuming that development of air

AERONAUTICS presents here the informal opinions of vital men, believing that in a rapidly changing industry, these are of great value in estimating the direction aviation will take. These are selected primarily for value in thought or opinion.

transport will soon call for regulation similar to that exercised over railroads, busses and other common carriers. Such regulation, properly exercised, can offer as much protection to the investment of the air transport operator as it offers to the user of his service. At the same time, the subject is one which must be handled with the greatest of care lest regulations become too drastic. It is no more desirable to regulate fares at too early a stage than it is to limit the competition before this is fully justified. Personally, I believe that the time for such regulation is not yet here.

I further believe that it would be best for all concerned if the initiative (in asking regulation) came from the air transport operators themselves.

ARCHIBALD BLACK, PRESIDENT
—BLACK & BIGELOW, INC.

Wichita, Kansas, July 18.—It is only by the efforts of people like yourself, backed by the fortunately large circulation of your publication, which can crystallize public sentiment to the point when something may really come to the aid of our Military and Naval aviation.

I am entirely in favor of your outline and wishing you success in your editorial campaign, I beg to assure you of any cooperation which it may be possible for me to give you.

C. V. CESSNA, PRES.
—CESSNA AIRCRAFT COMPANY

Troy, Ohio, July 26.—I certainly agree that your editorial in August AERONAUTICS on "National Air Academy" is justified.

I am one of the people who feel that there should be a single department of National Defense with its proper divisions and was in the hope that it might cut down the perfectly ridiculous competition between various arms of the Service.

R. E. LEES, SALES MGR.
—THE WACO AIRCRAFT COMPANY

Los Angeles, Calif., July 19.—Many people lose sight of the fact that from Annapolis and West Point have come, not only eminent naval and land force commanders, but great business executives, trained to give orders and see that they are executed properly.

What greater boon could Aviation win for itself than an influx of trained executives from a National Air Academy; men who know what they are talking about so well that they can go out and do it themselves.

Such a group would do the country and Aviation a double good. They would become peace-time promoters of a more rapid aerial progress, and constitute a remarkably strong air reserve force for war-time to swell and expand the constant group that would make military air service a career.

C. O. DAVIS, DIRECTOR, BUREAU OF PUBLIC RELATIONS
—AIRCRAFT FINANCE CORPORATION OF AMERICA

Brown Field, Quantico, Va., Aug. 27.—The contention that the United States should have a national aeronautical academy to complement the present service institutions is carrying the idea of a separate air service to its logical conclusion. The best training for naval officers is obtained at the Naval Academy as agreed by officers and civilians alike. Similarly, the Army derives its best commands from its Academy. Is it too much to expect that, once an Air Academy is in full operation, its graduates will make the best officers for the air service? And if this projected unified air service ever becomes a reality, as indeed at various times seems possible, a common school for its officers becomes immediately necessary.

Disregarding for the moment the commercial growth of aviation, phenomenal in itself, the importance of military and naval aviation has been, and is, and will continue on the up swing. . . . The man who does not realize that aeronautics is perhaps the most essential element in war maneuvers today is the man who votes against aircraft appropriations and adequate defense. Some day he may be forced into a position where he cannot vote at all, by a stronger, better equipped, flying foreign power.

This increasing importance will some time, who knows how soon, install its own training system in a new institution where, springing fully armed, the Dragon's teeth of the air will assume the duties of military aviation laboriously laid down by the present Army and Navy trained pilots, who see many advantages in a unified and self-taught separate air service. The ugly duckling has long since become a swan, and has developed numerous ailments and ills which could be remedied quickly and adequately if studied by a co-ordinated, centralized command. As it is now, when the Army, Navy, or Marine Corps has pressing need of funds in some other direction, aviation sits back and waits. Without a unified budget of its own it will never attain the dignity and support necessary for efficient and proper advancement.

AERONAUTICS has done well to propound this platform . . . but thus far, in its erudite pages AERONAUTICS has mentioned two possible sites for the founding of such an Academy, both of which fall woefully short of the essentials for complete training. Wichita, Kansas, might send a delegation to Washington numbering five thousand aeronautical employes; Dayton could importune every member of Congress by offering acres of free land, but neither city will become parent to the unborn child. Numberless square miles of superb landing fields in every direction, thousands of miles of natural defense from the seaboard, all centers of commercial aviation, could not induce this possible academy to these cities, because both of them are land-bound. . . . From a careful check of the present military and naval training fields it would appear that North Island, California, most nearly approaches the desired conditions. To graduate the best pilots in land and sea planes means training where students can obtain actual conditions most common to flying in both types of craft. Good flying weather, an average sea, landing field area, flat and warm country, mountainous and cold country, and even rainy weather are to be found within easy flying distance. Is it not more logical to locate a school such as you suggest in such a region, than to think of founding it in a smart city whose citizens raise the biggest echo heard in Washington, or in a town whose principal claim to notice is that they are producing 2,500 airplanes this year?

LIEUT. HORACE S. MAZET, F.M.C.R.

Milwaukee, Wis., July 22.—Answering your letter of July 16 in reference to your editorial that will appear in your August issue of AERONAUTICS. This is very important as well as beneficial to the Airplane Industry and the public in general.

We hope to see more editorials on this order. Your magazine has always impressed me a great deal and I know that the success you are enjoying is entirely based upon the clean and practical information that is given to the public.

A. W. SIRGHOFF, GEN. MGR.
—ZENITH MFG. CORP.

Detroit, Mich., Aug. 7.—It would seem, offhand, as if granting a company the exclusive right to operate between two given points would most likely hinder rather than promote. I say this because I believe, to begin with, the company that is successful in obtaining an air mail contract would have a big advantage over an operator that didn't have a mail contract. Therefore, unless the second company would be unusually strong financially, or have much more serviceable equipment, he would be seriously handicapped. I believe, however, the second company should have the privilege of competing if their set up was right, as it might be their chance of success would be actually better than the first company that started operation.

I am sure that in another year we will all be in a better position to know just what is the best thing to do along these lines. In the meantime, I believe it would be the wrong move, to make laws that would be hard to change later.

EDWARD A. STINSON, PRES.
—STINSON AIRCRAFT CORPORATION

XUM

BRIEF NOTES FOR THE MONTH

A digest of the important information and developments of the month, compiled each issue for the busy executive with vital information classified and quickly accessible.

AIRPORTS

A model airport for the national capital is being designed. The plans, prepared by Eugene H. Callison, include a terminal building, surmounted by a control tower, containing offices for mail and baggage, two concourses, general offices, a large waiting room, facilities for customs, public health and first aid, a restaurant, and telegraph, radio and telephone equipment. Four covered taxiways will adjoin the terminal, with ramps leading to the plane doors.

An electric "monorail locomotive" to operate hangar doors have been installed at the Cleveland Municipal airport and at Pontiac, Mich. Allen & Drew, Inc., of Cambridge, Mass., developed a standardized unit which replaces one or both of the rollers upon which the door rides. Power is conveyed through flexible cables and operation is by means of push buttons.

Leonard Macomber, Inc., has been retained as engineers and contractors for the construction of an airport for the city of Muncie, Ind. The company also has been retained to make preliminary surveys for airports at Sioux City, Ia., Iowa City, Ia., Sioux Falls, S. D., Rock Island, Ill., and Dubuque, Ia.

Eight steel and concrete buildings are being added to Roosevelt Field. These will provide 100,000 square feet of hangar space and 60,000 square feet of office, shop and exhibition space. Seth Low, president of the field corporation, signed contracts through Stone and Webster with S. S. Roth and Bros. for the improvements.

Curtiss Airports Corp. has undertaken a $3,000,000 development of the airport at Alameda in San Francisco Bay. The establishment of a seaplane base, a flying field, a yacht harbor and bathing beach on the present strip of ground to be extended 2,000 feet into the bay are called for by the plans.

Central Construction Co. of Harrisburg, Pa., was given the contract for the construction of a 300-acre airport in that city. Plans to make the field one of the main landing places on a projected New York-to-Pittsburgh passenger air service await completion of the work.

Bettis Field at Pittsburgh has been purchased from the Aircraft and Airways of America by the Curtiss Airports Corp. Kenneth Franzheim, architect, has completed plans to improve the field to make it a flying service base and transport terminal.

A contract for 100,333 square yards of cut asphalt has been let by the Fairfax Airport of Kansas City. The asphalt will eliminate dust on the field and facilitate all weather flying.

Radio beacon towers, 100 feet in height, will be erected at Calgary municipal airport, Brandon, Manitoba, Regina, Saskatchewan and Maple Creek.

Fernie, B. C., will establish an airport in a city park. The field will have a north-south runway 2,675 feet long and an east-west runway of 975 feet.

Construction of a second hangar at the Rochester Municipal Airport has been started. A light control tower will top the new structure.

Big Spring, Tex., has provided the only illuminated airport between Fort Worth and El Paso.

A $60,000 airport will be established at Guayaquil, Ecuador. Half of this amount will be spent this year.

CHANGES

The Wien Alaska Airways, the Bennett Rodebaugh Airplane Co., and Anchorage Air Transport have been acquired by the Aviation Corp. Alaska Airways, Inc., is the holding company.

Aero Corporation of California, Inc., has acquired a stock interest in the Mid-Continent Air Express, Jack Frye, president, announces.

Command-Aire, Inc., announces that it has withdrawn from a sales arrangement with Curtiss Flying Service, Inc., effective November 1. Hereafter, Command-Aire planes will be marketed independently through its own sales organizations, although its planes will still be serviced at the 42 branches of the Curtiss Flying Service, as well as through Command-Aire's dealer organization. A recent merger of Curtiss and Wright interests, in which the joint organization acquired ownership control of companies manufacturing planes of the same price, class and type as Command-Aire, was given as the reason for the change.

ARMY & NAVY

With the completion of successful tests by which planes were launched and recovered by the dirigible, Los Angeles, Rear Admiral William A. Moffett announces that the value of lighter than air craft to commerce has been increased. Admiral Moffett predicts that dirigibles will be used in the future as refueling bases.

Harry F. Guggenheim has named Capt. Ray A. Dunn of the army air corps as consultant to the Guggenheim Fund in a comprehensive study of the question of aviation insurance.

Demonstrating the rapidity with which it is possible to empty a commercial airplane of its passengers, six members of the Parachute Department of the army air corps made jumps at three second intervals.

A contract for 564 Type B. 6 aircraft compasses was awarded by the army air service to Aircraft Control Corporation of Philadelphia.

FOREIGN

Landing and parking fees for public airdromes in Chile have been fixed by the ministry of war, Luis E. Feliu-H, consul general of Chile, announces. These include: One seater, 12 cents for landing and 25 cents including parking for 24 hours. Both services for one month, $6. More seating capacity is taxed proportionately. A complete set of regulations for the governing of foreign planes in Chile is also announced.

Cuba's first commercial flying service and general aircraft sales agency, with headquarters in Havana, have been established by the newly organized Cuban Flying Service, Inc., under the sponsorship of the Fairchild Aviation Corp.

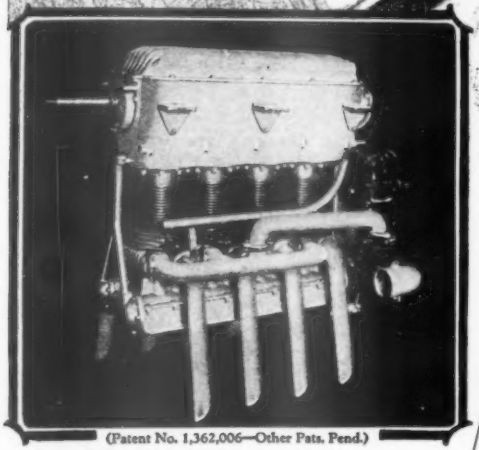
New aircraft, numbering 113, were registered in Canada during the second quarter of the year. This makes a total of 337 now in operation. Seventeen new airports were licensed. To date there are 278 commercial pilots, 253 air engineers, 221 private pilots and 53 licensed airports.

Honore Bertone, an Italian aviator and automobile mechanic of Havana, has invented and perfected what he calls an airplane-automobile, a vehicle which can run on land and fly in the air. He estimates the cost of construction at about $3,000.

Le Bourget airport's traffic record for passengers and planes was broken on Aug. 17 when 49 planes and 300 passengers arrived and departed. A total of 12 tons of freight was moved. The pre-

[*Continued on page 66*]

Chevolair D-6 WINS!



(Patent No. 1,362,006—Other Pats. Pend.)

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AERIAL NAVIGATION

STARS AND HOW TO FIND THEM . . . . .

by
Cdr. Douglas G. Jeffrey, R. N.

"The stars are the true landmarks that are never changed—he who knows the stars carries the map of the world in his head."
—Garrett P. Serviss

"HITCH your wagon to a star" is good advice, but it is just as well to know which star to "hitch" to. The ability to readily recognize the more brilliant stars and to locate them is an essential qualification for the proficient navigator. This with a little practice is not difficult on a clear cloudless night, and can be accomplished without a great deal of trouble, given a Nautical Almanac and a sextant, when conditions are not so favorable. The best time for the novice to commence his observations is with the moon, say, seven days old. The light of the moon under these conditions blanks out the fainter stars and makes the bright ones more conspicuous. A perfectly clear moonless night is not the best time for the novice, as the number of stars visible is confusing.

Stars were grouped by the early astronomers in constellations named after animals, instruments in general use, and the notables of ancient mythology. It is generally accepted that the first classification must have taken place some 2700 years B. C. and that the classifiers must have lived somewhere in the neighborhood of what is now Mesopotamia. This argument is based on the fact that the early constellation names contain no reference to the elephant, camel, tiger or crocodile (although the names of other animals were freely used) and, further, that the portion of the sky mapped by these fathers of Astronomy was the portion that would be visible from Latitude 38° to 40°.

However, it may be that Ptolemy got busy about A. D. 150 and gave the world a list of 48 constellations, 21 Northern, 15 Southern and 12 Zodiacal. The latter, known as the "Signs of the Zodiac," were arranged in a belt to mark "Apparent" path of the Sun and were named the Ram, Bull, Twins, Crab, Lion, Virgin, Balance, Scorpion, Archer, Goat, Waterbearer and Fishes. If blessed with a particularly vivid imagination, the student of the stars may be able to trace some resemblance between the names and the formation of the various constellations. The writer has never been able to do so.

This survey of Ptolemy by no means covered the whole sky and a large part of the Southern Hemisphere remained uncharted. At best all that Ptolemy did was to revamp the lists of Hipparchus (140 B. C.) and Exoudos (370 B. C.), the latter being based on Greek records that were at least 2,000 years old at that time. Until 1601, the world seems to have been content with its 48 constellations. In that year a Danish nobleman, Tycho Brake, added a couple more and forthwith for the next two hundred years every astronomer worthy of the name considered it his bounden duty to map new groups and name them in accordance with his fancy. By 1800 there were 109 con-

TABLE 1—*The Twenty Brightest Stars*

Popular Name of Star	Constellation and Bayer Letter	Magnitude	Color
Sirius	αCanis Majoris	—1.6	Bluish White
Vega	αLyrae	0.1	Bluish White
Arcturus	αBootis	0.2	Orange
Capella	αAurigae	0.2	Yellow
Rigel	βOrionis	0.3	White
	αCentauri	0.3	White (I)
Canopus	αArgus	0.4	Bluish White
Procyon	αCanis Minoris	0.5	White
Achernar	αEridani	0.6	White (I)
Betelgeuse	αOrionis	0.9	Red
Altair	αAquilae	0.9	Yellow
	βCentauri	0.9	White (I)
Aldebaran	αTauri	1.1	Red
Antares	αScorpii	1.2	Red
Pollux	βGeminorum	1.2	Orange
Spica	αVirginis	1.2	White
	αCrucis	1.3	Bluish White (I)
Formalhaut	αPiscis Australis	1.3	Orange
Regulus	αLeonis	1.3	White
Deneb	αCygni	1.3	White

Stars marked (I)—Not visible in United States.

Note: The Bayer (Greek) letter preceding the name of the constellation denotes the star's position in the particular group.

Although definite colors are allocated to different stars in above table, it will be found that in every case white predominates, and in reality it is only a tinge of the color in question that is actually seen with the naked eye.

Performance Beyond Horse-Power
The BARLING NB3 Proves It!

First in Speed—Light Plane Efficiency Race, National Air Races 1929.

First and Second—Combined Speed and Load Race for Light Planes, National Air Races 1929.

American Altitude Record for Light Planes—20,862 feet.

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Second—All Ohio Derby—National Air Races 1929.

Second—Free for All Light Plane Speed Race, National Air Races 1929.

THE BARLING NB3—the only approved 3-place, all-metal structured, low wing monoplane—placed first or second in every event entered at the 1929 National Air Races.

Equipped with LeBlond 60 H. P. Engine, $3,600 Factory
Equipped with Velie 65 H. P. Engine . . $3,600 Factory
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Our new Sales Plan is in effect. Factory branches are established—our quick-delivery problem is solved. Direct factory assistance to dealers is an exclusive feature! Write for our profitable Dealer Plan.

NICHOLAS-BEAZLEY AIRPLANE CO., Inc.
Manufacturing Division Marshall, Missouri

BARLING NB3 Monoplane

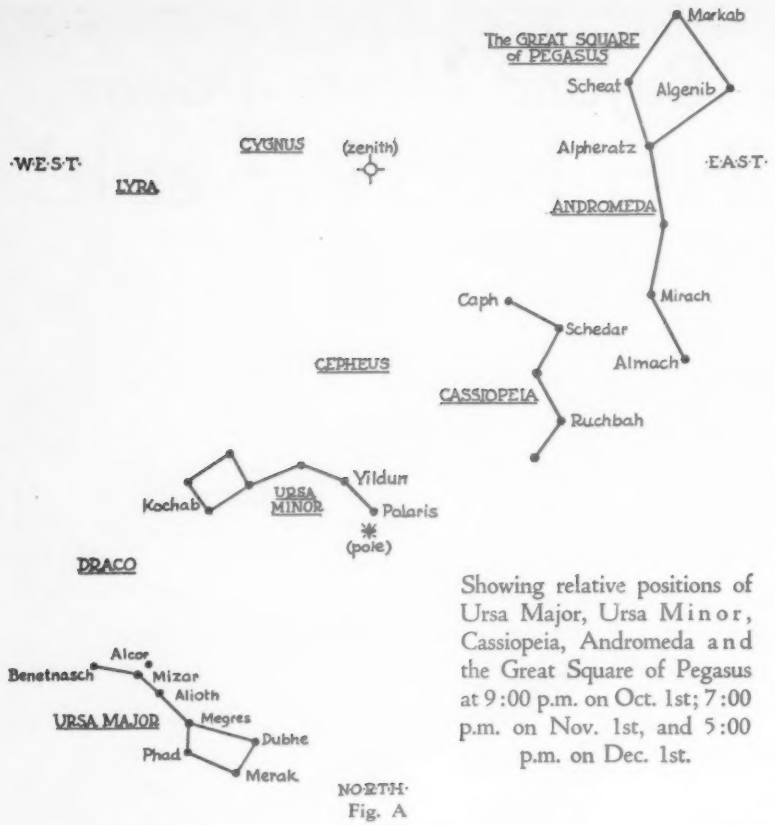


Fig. A

Showing relative positions of Ursa Major, Ursa Minor, Cassiopeia, Andromeda and the Great Square of Pegasus at 9:00 p.m. on Oct. 1st; 7:00 p.m. on Nov. 1st, and 5:00 p.m. on Dec. 1st.

stellations and in the same year "Argo," a large southern constellation, was divided into four, making a grand total of 112. These additions and subdivisions lead in many cases to overlapping and eventually, by international agreement, the number of constellations was reduced to 88. These 88 do not overlap, have definite boundaries and cover the whole sky. Having just written the above, I read in the current press that a new 200 inch telescope recently installed in California is likely to discover many more. If this is so we can take comfort from the fact that they can have no possible bearing on navigation.

There are about 6,000 known stars visible to the human eye, only half of these are visible at any one time and under average conditions only about 2,000 are visible. Lest navigators should take alarm, I hasten to add that if they can readily identify twenty of the brighter stars and constellations the remainder will prove simple. The following table (Table 1) will be useful for future reference.

The earliest known method (now obsolete) of designating a particular star was to refer to it as in the "head of Hercules," in the "beak of the Swan," etc., etc. I have seen this method used in a textbook as recent as 1908, and to those gifted with "imagination" it may still prove of value.

Modern methods of designation are: by name (probably less than 100 names are in general use); by letter (introduced by Bayer, 1603) and by number (introduced by Flamstead in 1708) for those stars not lettered, and numbers running from East to West. Stars are also graded for magnitude; magnitude in this case having no relation to bulk but merely denoting a comparative brightness. Ptolemy graded the stars for magnitude from 1 to 6, the latter being the faintest, the former the brightest, his contention being that the human eye was incapable of any finer distinction. Difficulty arose with this system owing to the personal equation and hence a lack of uniformity among various observers. Magnitudes of some of the minor stars were found to differ as much as two or three, when observed by different persons. It was not until 1850 that Pogson proposed the formula that is in force today, namely $b_1 = \sqrt[5]{100}\, b_2$ or 2.512 as the ratio between successional magnitudes. This formula in "longhand" reads "the logarithm of the ratio of brightness equals four tenths of the difference of magnitude." Using this formula: If the magnitudes of two stars are given, the ratio of brightness may be computed, and if the ratio of brightness and the magnitude of one star is given, the magnitude of the other may be computed. This system has been generally adopted and all magnitudes are now expressed in it. Polaris (Ursae Minoris) being used as a basic star. By photographic means all stars are compared with it and the ratio of brightness and the magnitude thus determined.

Methods of Locating Stars and Constellations

THERE are three standard methods advocated for the novice: (a) By constellation tracings, (b) by individual

[*Continued on page 58*]

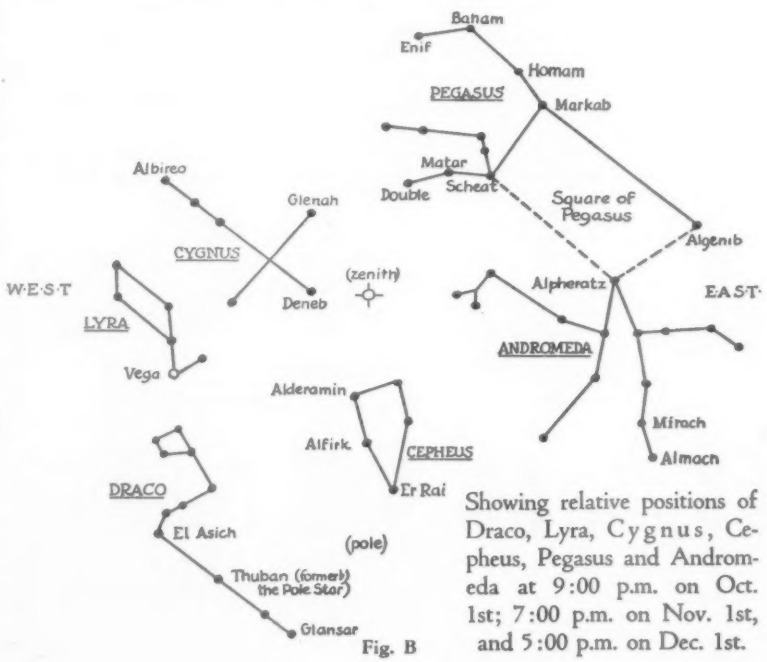


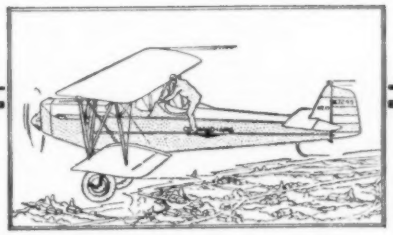
Fig. B

Showing relative positions of Draco, Lyra, Cygnus, Cepheus, Pegasus and Andromeda at 9:00 p.m. on Oct. 1st; 7:00 p.m. on Nov. 1st, and 5:00 p.m. on Dec. 1st.

STABILITY

Command-Aire Model 5-C-3 Powered with Wright J-6 Five Motor

STALL SPEED CONTROL «» AND HOW!



WHEN after dark the motor died in a Command-Aire Trainer above the city of Chicago recently, and the plane was landed safely in a walled-in, unlighted brick yard, without scratching a wing or injuring either passenger, it only proved again that Stall Speed Control is Command-Aire's Birthright.

In winning and holding the confidence of more and more pilots and owners each month, Command-Aire demonstrates unerringly in each ship turned out, that its famed STABILITY is not chance, but uniform engineering certainty.

Command-Aire factory test flights then, wherein the pilot leaves the cockpit and rides the fuselage while the plane continues steadily on its way, are not spectacular stunts, but an unchallenged demonstration that Command-Aire virtually flies itself.

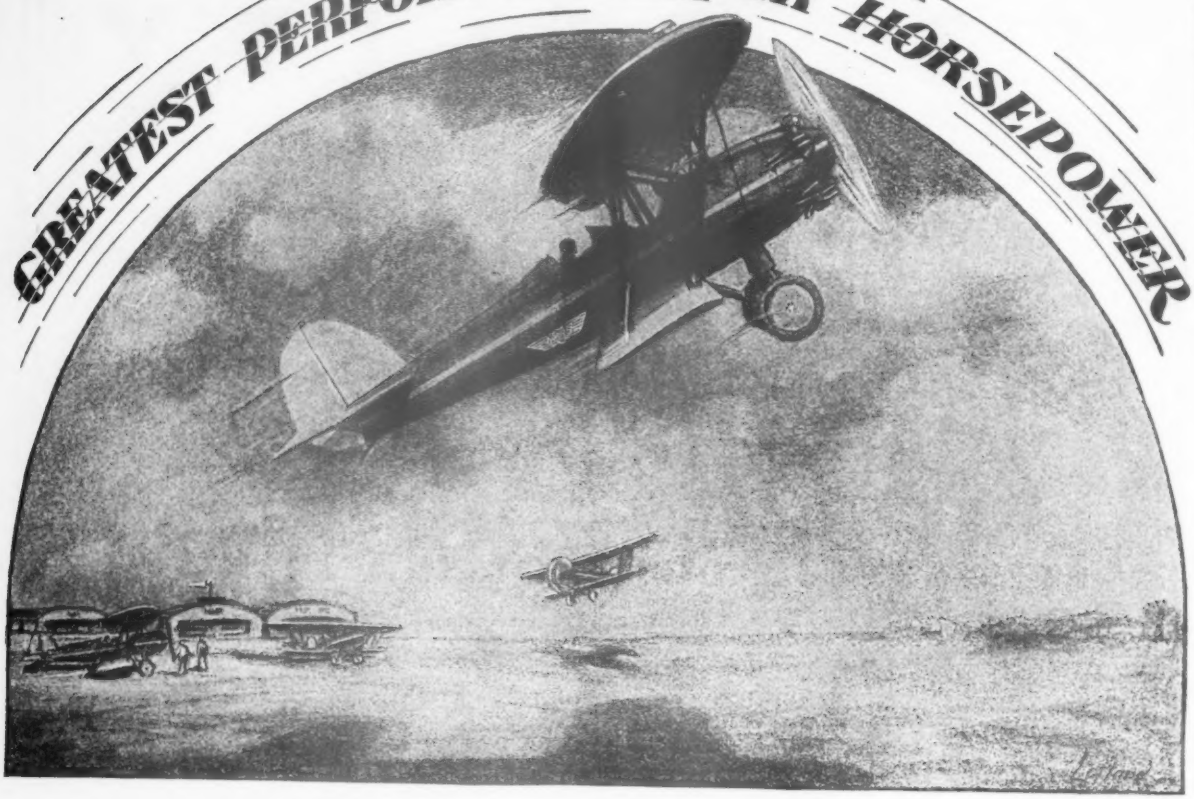
With this matchless STABILITY, Command-Aire combines the structural integrity of chrome molybdenum steel tubing, Navy specification spruce, 50 per cent excess rigidity in wing construction, slotted joining of ailerons, and the well-groomed finish of a smart yacht—all correctly engineered into a finished ship distinguished by sleek, flowing lines, ample power—and commanding the unstinted enthusiasm of everyone who flies it. Shall we send you all the facts attractively illustrated? Just write COMMAND-AIRE, Incorporated, *Little Rock, Arkansas.*

SPECIFICATIONS

Span Upper Wing	31 ft. 6 in.
Span Lower Wing	31 ft. 6 in.
Wing Area	303 sq. ft.
Height	8 ft. 4 in.
Length Overall	22 ft. 5 in.
Chord	5 ft.
Gap	5 ft.
Stagger	9 in.
Dihedral Upper Wing	None
Dihedral Lower Wing	2 Degrees
Gross Weight	2350 lbs.
Weight Empty	1400 lbs.
Useful Load	950 lbs.
Capacity	Pilot and Two Passengers
High Speed at Sea Level	120 Miles
Landing Speed	36 Miles
Cruising Range	520 Miles

COMMAND-AIRE

GREATEST PERFORMANCE PER HORSEPOWER



Dual control with front unit quickly detachable for passenger carrying.

Landing gear split axle type with combination oleo rubber shock absorbers.

Perfection in aileron design. There has been no cheapening in simplifying.

Metal turtle-deck from front to rear allowing ease of internal inspection.

TO achieve the greatest of all performances in the popular-priced class, the Kinner has been introduced as standard BIRD equipment.

Low maintenance cost, uniform performance, the highest possible safety factor and its many other features, expected only in planes of the highest price, are winning more pilots for the BIRD every day. *Fly one today!*

The first entry to be tested in the Guggenheim Safety Contest now running.

Stability perfected to a degree allowing for fool-proof student training.

Chrome Molybdenum tubing throughout assuring highest safety factor 8 plus.

The wing design permits performance comparable to slotted wings. Will not spin.

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BIRD

Safety with Performance

BOOKS OF THE MONTH

AERONAUTICS will be privileged to give information concerning books and publications relative to any phase of aviation on request.

AERIAL Navigation and Meteorology, by Capt. Lewis A. Yancey, master mariner (unlimited). Published by the Norman W. Henley Publishing Co., New York.

The pilot will find in Capt. Yancey's book most of the vital principles of aerial navigation he should learn. The volume is really a complete course in navigation.

It begins with simple datum that is the groundwork for the more intricate forms of navigatorial problems in the body of the book. However, such was the care used by the writer in this early foundation work that the reader—the student—is able to continue until the end without a mind befogged by the use of unfamiliar terms.

Capt. Yancey kept in mind the need of complete description as a guide to his readers and carried his points with simple (and more intricate) problems which the student is expected to solve and check with the right answer.

The chapter given over to Meteorology is especially good, having obviously been the result of Capt. Yancey's years of experience as a navigator. It is short, to the point and covers almost everything that the pilot should know.

In summation, Capt. Yancey's book is exactly what he has planned it—a treatise meant to give the young flier sufficient knowledge to become fairly adept in finding his way scientifically. It is not an autobiography in any sense of the word, as many volumes of this kind might be called, for it draws on Capt. Yancey's experiences only to drive home points.

APPLIED Aerial Photography, by Capt. Ashley C. McKinley, aerial surveyor, Byrd Antarctic Expedition. Published by John Wiley & Sons, Inc., New York.

The pilot who wants to keep abreast of all phases of his work will find this volume of Capt. McKinley of vast importance. Chapters explain the mode of procedure that a pilot should follow to give assistance to his photographer in the making of clear and perfect reproductions of the necessary terrain. The book points out the need of cooperation between the man who takes the pictures and the pilot.

And, too, the photographer who is looking to the air as a further means of promoting his work will find in Applied Aerial Photography a volume complete in detail. More, it shows that the work of the photographer is hinged directly to the work of the pilot—two phases of photographic work that are seldom joined on the ground. Generally speaking, the photographer is a "lone wolf" in his studio, but aloft he must give attention to the manipulation of the plane to get the effects that he desires.

The chapters on development are unquestionably one of the finest features of the book. They show the importance of the man in the laboratory on whom falls the final job of turning out acceptable pictures. The laboratory man is important—more, he should understand what the photographer and pilot go through before they put the undeveloped negatives in his hands.

All in all, each phase of the book is carefully compiled and is well worth attention.

Map makers will also find the chapter on Oblique Aerial Surveys, written by A. M. Narraway, chief aerial surveys engineer, department of the interior, Canada, of interest.

AVIATION from the Ground Up, by Lieut. G. B. Manly, U. S. Army Air Service, Res. Published by Frederick J. Drake & Co., Chicago.

With the novice constantly in mind, Lieut. Manly has written a volume that should be placed in the front row of the aerial beginner's library.

The book, while it is not unlike many others written for the embryo airman, has an advantage that it covers the ground more thoroughly than most, accentuating the ground element to good advantage. The chapters given over to engines are particularly good, going into detail concerning their construction and characteristics.

It might be said to newly fledged pilots that the book will be worth reading, chiefly because it will give them a review of work that they have just completed.

The main adverse criticism is to be found in the chapter on "Handling the Ship"—just as it is in almost every book of this kind. The chapter approaches the subject diffidently and doesn't recover the sureness of the rest of the book until "Aerobatic Stunts and Maneuvers," the next chapter, gets under way.

However, this criticism is not of much importance as the only real way to learn flying is with an instructor, which Lieut. Manly does point out insistently.

SKY Slang Dictionary and Aero-nuttics, published by Aero Book Co., Wichita, Kans.

Written in a humorous vein, Sky Slang Dictionary and Aero-nuttics without a doubt fulfills the idea in mind when it was published—to give certain information concerning aviation in saleable form.

Generally speaking, the definitions, if taken here and there with a grain of salt, are sufficiently clear to impart to the layman something of the language of the professional airman.

WESTINGHOUSE Airport Lighting, published by Westinghouse Press Service, East Pittsburgh, Pa., for distribution to interested people.

The booklet deals with airport lighting. It begins with an argument for lighted airports, comparing a dark one with a railroad without night signalling equipment. Then are given the department of commerce lighting requirements.

Following those, the booklet shows in photograph and diagram how Westinghouse has met those requirements with various types of beacons, etc.

The sixteen page treatise is well printed and probably will be of value to owners of dark airports—for it gives something to work with in making lighting plans.

AERONAUTICS Bulletin, No. 3, Department of Public Works, Idaho. A report of Western States Air Commerce and Airways Conference, held July 8, 9 and 10, 1929.

Included are excerpts from talks by P. G. Johnson, Major H. B. Blee, Alvin O. Priel, Talbot Freeman, Lieut. Comdr. E. W. Spencer, Edison E. Moulton, Early B. Wadsworth, C. W. H. Smith, Govs. H. C. Baldridge and George H. Dern, etc.

THE NEW AERONCA C-2

J. R. SCHMIDT

One of the truly remarkable planes to make its appearance is the new Aeronca C-2.

It is the result of the work of a French engineer, Jean A. Roche, who has lived in this country since 1906.

This unusual craft has attracted large crowds wherever it has appeared.

The extraordinary aspects of its design permit a low landing speed without sacrificing a satisfactory angle of climb. The plane rises from the ground in 5 seconds. Maneuverability is high and it responds readily to light stick work. It is claimed that it will come out of a forced spin of its own accord, and that the plane will carry more than its own weight of 400 lbs. in useful load.

The maximum speed is 82 m.p.h. Horsepower 35. The fuel consumption is said to be even lower than that of a light automobile.

The gliding angle is very great, achieved by increasing the efficiency of aerfoils and enclosing the entire landing gear, so that it is possible to achieve a gliding ratio of one to eleven at a height of one mile.

Another unusual feature is claimed—aileron control at well below 25 m.p.h.

Designed for solo training and short cross country jaunts, its price is $1850 flyaway Cincinnati. Manufactured by Aeronautical Corp. of America.

View showing the extraordinary body and tail surfaces of the Aeronca C-2.

THE AVIATOR'S JACKET - - - - - - $5.50

The Original

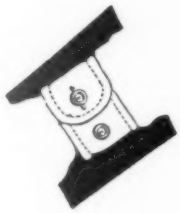
BUCK SKEIN JACKET

IT'S WARM!

LOOKS LIKE LEATHER
WEARS FOREVER

THERE are two things that every aviator needs. First, and most important is a trustworthy plane, a plane that will respond to the "stick".—Secondly, WARM, comfortable clothes . . . for no matter how mild the weather on old Terra Firma is it's always colder up near the sky in a roaring plane. Yes, Buck Skein is the Aviator's Jacket because its hefty suede-like softness imparts a furry warmth that the coldest weather can't discourage. And that's not all!

Buck Skein's two large flap pockets are practical. You can always keep a couple of bars of chocolate and a pack of cigarettes handy in them.



Buck Skein's double button cuffs can be buttoned up snugly around the wrists and thus keep the wrist and arms warm.

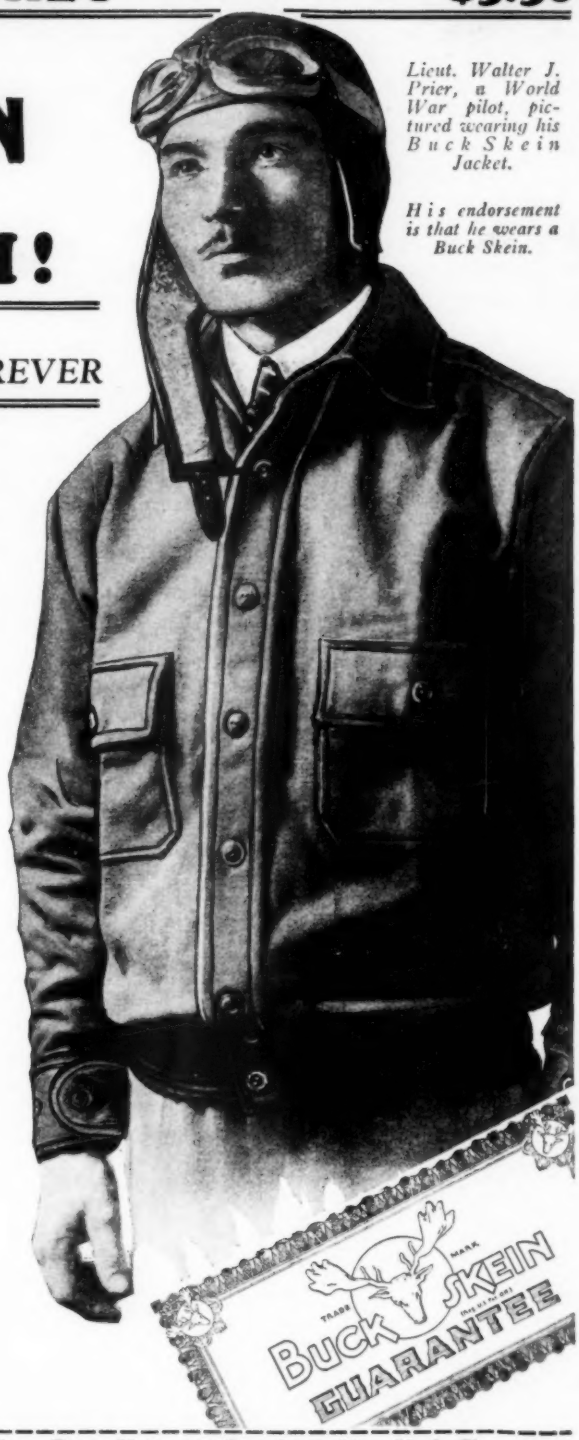
If your Buck Skein gets greasy simply wring it out in gasoline or wash it in soap and water and it will clean instantly and come out soft and mellow like suede.

MONEY BACK GUARANTEE—If a Buck Skein fades, if it shrinks, if it loses its fine texture, if you aren't completely satisfied, you get your money back.

IMPORTANT

If your dealer can't supply you, send me your check or money order for $5.50 for the Jacket or $3.50 for the Shirt, and I'll personally see that you get your Buck Skein at once.

Buck Skein Joe



Lieut. Walter J. Prier, a World War pilot, pictured wearing his Buck Skein Jacket.

His endorsement is that he wears a Buck Skein.

Buck Skein Joe, % Lustberg, Nast & Co., Inc., *Makers*, Dept. X-11, 331 Broadway, New York City

SEE THAT I GET: CHECK HERE

A Buck Skein Jacket at $5.50 ☐
A Buck Skein Shirt at $3.50 ☐
Combination of Shirt and Jacket at $9.00 ☐
Neckband Size.....

Enclosed check ☐ Money order ☐

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.....

INAUGURATING AN AMPHIBIAN LINE

[*Continued from page 26*]

constructed on them. Such floating depots would cost a tremendous sum to build and there would be a number of engineering problems to overcome.

From the experience the Thompson Aeronautical Corporation has gained in operating its line this year we have learned that the question of finding a satisfactory means of communication between the planes and the operating stations, in the event the craft is forced down on the water, is important.

We have experimented with radio but the equipment available at present is so huge and weighty it is impractical for ships of the type we use. The radio outfits suitable for our purpose weigh several hundred pounds and would cut down our pay load to the point where it would enlarge our operating cost to a restrictive degree.

Pilots flying air transports overland and forced down may get in communication with home offices by telephone or telegraph, while amphibian pilots lack this advantage.

Our company has overcome the problem of communication by having several routes for the planes to follow and by depending on visibility and large shipping traffic. One route follows a direct line between the two cities. This is the course taken when weather reports indicate flying conditions are normal, although an additional safety factor is added as the planes are always in sight of a number of steamers.

A second course follows the lake islands and regular steamer lane. By following this route the planes are always in sight of land and in view of half a dozen or more steam ships.

The line of flight to be taken is determined before the ships take off and midway across the two TAC planes pass. In the event one fails to sight the other, this report is made upon the arrival at its destination and a check is made immediately to learn whether it has arrived at its terminal. Thus we know pretty well what to do within less than half an hour after any landing may have been necessitated.

Amphibian lines will not always be able to resort to such a method of keeping in touch with the movements of their planes and it is imperative that a light radio which can both broadcast and receive from the water be developed with a range of 100 or more miles. Experimental work is under way on such equipment now; but the great difficulty seems to be in the cutting down of the weight of instruments and amplifiers.

A natural fear of water, and because flying over water in amphibian planes is practically new, was a handicap at first; for prospective travelers were more familiar and confident in the conventional air transport used by overland lines. But it has not been extremely difficult to convince many of these travelers that the amphibian in many respects is safer than other ships.

The fog hazard in the operating of an amphibian line is real but it is much safer flying through fog over water than over land, as the water affords an almost perfect landing field throughout its whole surface. An amphibian may, therefore, light on the water and taxi through the fog belt, as it is usually smooth water when foggy.

On the very first trip of the Thompson line with Amelia Earhart, the famous woman flyer, piloting the Miss Cleveland, one of the ships, with Ralph DeVore, had to come down on the water due to heavy fog. She taxied along the water until the fog cleared and then proceeded on her way in flight.

In the section of the country in which the Thompson Aeronautical Corporation operates the season for an amphibian line is limited to not more than seven months. The period is from about the first of April to the first of November; the remainder of the year being impossible for the successful operation of such a line because of the lake and river being frozen over or water freezing on the amphibian gear and preventing its operation. Consequently the question of how to keep the personnel and equipment intact and profitably employed during the slack months presents itself.

A company has the alternative of continuing its line between the cities served, by using the regular airports as terminals; conducting an amphibian service between popular winter resorts in the southern states, or chartering the planes to wealthy individuals for periods of a week or longer.

The operation of a southern line, or the chartering of the planes to people of affluence present the most profitable possibilities, we believe. For the main reason an amphibian line can compete with a line of another sort is because of the advantages it offers in safety, speed, through its ability to fly a direct line across water and land, and the nearness of its terminals to the business centers of the cities it serves. Therefore, we have no talking points which would make travelers use our line if we continued operations overland in the months during the winter. We have mentioned some of the outstanding problems a company wishing to start, or already conducting an amphibian line must meet and solve. It might be well now to point out a few of the advantages the latter type of line offers over air routes of other types.

We have called attention to the fact that the fog hazard is diminished through the ability of the amphibian to land on the water and taxi through the fog belt.

The water and character of the plane offers the factor of completely discounting all expenditures which would be necessary in laying a hard surfaced runway, as is necessary in the case of a landing field. Millions of dollars are spent buying land for an airport, putting in a drainage system, laying runways and removing trees, gullies and other hazards which jeopardize takeoffs and landings.

Any body of water of adequate depth and area affords a natural landing surface without the expenditure of a single penny.

The nearness to downtown business centers of cities for terminals available to flying boat operators is of inestimable value. At present the steady day in and day out passenger list of all air lines is made up, for the most part, of business men and travelers who find it essential that they reach their destination in the quickest time possible.

Of course, as the public becomes more air minded, this will not hold true; but the speed factor and accessibility to the point of arrival and departure will always be essential to the success of a line.

The Detroit air depot of the Thompson Aeronautical Corporation's Detroit-Cleveland amphibian line is three hundred feet off East Jefferson Avenue, one of the main thoroughfares, and not more than fifteen minutes by taxi, bus or street car—all of which are available—from the city hall.

Our depot in Cleveland is even more conveniently located. It is at the foot of East Ninth Street, and a short five minutes taxi ride from any business district office building or hotel. Here, too, bus and street car services are available.

In both cities the TAC terminals are as easily reached as the railroad stations.

This clearly indicates an additional advantage the flying boat or amphibian operator has over an organization offering a different form of air travel: There is no expense in maintaining a bus service to and from air fields in outlying sections of cities touched. The passengers, therefore, are saved the necessity of meeting at a central location to board a bus, or a long taxi ride to the airport at their own expense if they miss the bus.

Over water flying is more enjoyable than over land flying because the atmosphere is less bumpy. It might be well to enumerate a few of the common causations of bumpy atmosphere here.

For some years it was believed that bumps were caused by "air pockets," but after some study it was learned that the "bumps" were the result of upward and

[*Continued on page 113*]

KEYSTONE-LOENING AMPHIBIAN "AIR YACHT"

AMPHIBIAN TRANSPORT

By bringing the passenger closer to the centers of great cities, both on the water front and the landing field, the amphibian plane saves the minutes that often make air travel worth while. Of this type of plane, transport executives unhesitatingly select the Keystone-Loening Air Yacht for daily passenger service. It is the one amphibian that has been thoroughly proven in millions of miles of flight. Its smoothness and steadiness, its ability to ride out rough weather in the air or on the water, its cheerful, quiet cabin, its low maintenance cost—far lower than any other amphibian used in transport work—these are the results of its basically sound design and the experience gained in years of practical operation. From the Atlantic to the Pacific, from Alaska and Canada to Central America, the Keystone-Loening Air Yacht is the symbol of safe, swift, direct transportation in the service of leading air lines.

6 to 8 passengers : 525 H. P. : 100 M. P. H., Cruising : $27,900

LARGE VIEW: Keystone-Loening Air Yacht on the Thompson Aeronautical Line, arriving at Cleveland from Detroit. SMALL VIEW: Passengers debarking at Cleveland.

KEYSTONE AIRCRAFT CORPORATION
SALES DEPT.—31ST STREET AND EAST RIVER, NEW YORK
PLANTS—BRISTOL, PENNSYLVANIA, AND NEW YORK CITY

THESE SUCCESSFUL LINES USE AIR YACHTS

American Air Express • Continental Air Service Curtiss Flying Service • Gorst Air Transport Imperial Airways of China • International Airways of Canada • Mexican Aviation Corporation • New York and Suburban Air Lines • Pan-American Airways • Pan-American Grace Air Lines • Pittsburgh Aviation Industries • St. Louis Aviation Corporation • Thompson Aeronautical Corporation • Wedell-Williams Air Service • Western Air Express.

AERIAL NAVIGATION [*Continued from page 50*]

bright stars, and (c) by the rising and setting of constellations. It is proposed to deal with these methods in the above sequence. Most of the well known constellations contain bright stars which when connected by lines, form figures, which (although) they have not the remotest resemblance to their given name, can be recognized and remembered.

Figures A and B show tracings of Ursa Major, probably the best known of all the constellations and certainly the most readily recognized in the Northern Hemisphere, Ursa Minor, Cassiopeia, Andromeda and a portion of Pegasus, the latter is not drawn to scale. Ursa Major like the poor is always with us and forms a good jumping off place for the novice. It is unmistakably distinguished by a remarkable cluster of seven bright stars forming what is popularly called the dipper. The stars (*a*) and (*b*) are known as the "pointers," because they always point to the Pole Star, 28½ degrees from (*a*). Polaris forms part of the constellation of Ursa Minor and we have already located two constellations and one very important navigational star. Referring to Figure A again, in the same way that the "pointers" gave us a position line for Polaris and the Little Bear, so a line through Megres in Ursa Major and Polaris will give us a line of position for Cassiopeia. Drawing a further position line through Polaris to Cassiopeia and prolonging it about an equal distance will give us a position line for one corner of the Square of Pegasus. The "Square" is not a constellation but a combination of two, Andromeda and Pegasus. Five constellations in five minutes. Figure "B" shows the four constellations (tracings) that are only shown by name in Figure "A" and also gives complete tracings of Pegasus and Andromeda. The above should be sufficient to indicate the methods to be followed by a beginner. Detailed instructions for the location of the various constellations can be found in many popular works on astronomy, some of which give charts for every month in the year or show stars on the meridian at certain time and date each month. There are also several mechanical contrivances on the market that by means of an arrangement of revolving discs reproduce the appearance of the heavens (for given latitudes) at different dates and hours throughout the year.

One of the best of these is Phillip's Planesphere, while the more elaborate Paget Star Globe is very useful for the essential groundwork previous to a long flight in which position has to be determined by astronomical methods. The Star Globe is a great labor saver in preparing lists of celestial objects suitable for observation during the actual flight. The essential data for these objects can then be extracted from the Nautical Almanac and entered in a small note book or on the margin of chart so that during the flight only the sextant and slide rule will be required.

The Star Globe consists of a hollow 7½ inch globe, representing the celestial sphere, on which are printed the poles, equator, meridians, parallels and ecliptic. The navigational stars are shown in their correct declinations and right ascensions (which hold good for a long number of years, for the rough purposes for which the globe is intended to be used) and their names and the names of the constellations are inserted. The sun, moon and planets, which do not of course occupy fixed places on the celestial sphere, can be inserted from time to time in pencil, according to the positions obtained from the Nautical Almanac.

The second method of building up an acquaintance with the stars is to start on the brightest stars (See Table I): Find out by looking up the constellations on a star chart or by referring to a Nautical Almanac how many are visible at the desired time of observation and in what part of the sky they will be located. Then persevere as before and build up your knowledge of the bright stars and then of the constellations surrounding them. This does require some practice, but it is surprising how much can be picked up in say an hour on a reasonably clear night.

The third system, that of identifying stars as they rise or set, has the disadvantage that the horizon is frequently clouded or hazy and also that it ties the observer to a particular hour and at some times of the year is altogether impossible. Table II which gives a list of Stars of the First and Second Magnitude rising in the Eastern sky at 9 p. m. on various dates may prove of use to students using the second and third systems.

TABLE II

Showing the stars of the first and second magnitude rising in the eastern sky at 9:00 p. m. on the dates specified.

Date	Name of Star	Constellation
January 1st	Regulus 1st	Leo
January 8th	Alphard 2nd	Hydra
January 11th	Cor Caroli	Canes Venatici
February 20th	Arcturus 1st	Bootes
March 1st	Spica 1st	Virgo
March 5th	Gemma 2nd	Corona Borealis
April 1st	Vega 1st	Lyra
April 20th	Ras Alhague 2nd	Ophiuchus
April 22nd	Deneb 2nd	Cygnus
May 9th	Antares 1st	Scorpio
May 26th	Altair 1st	Aquila
June 5th		Delphinus
July 17th	Algenib 2nd	Perseus
August 6th	Algol	Perseus
August 21st	Capella 1st	Auriga
August 21st	Hamel 2nd	Aries
August 27th	Formalhaut 1st	Piscis Australis
September 13th		The Pleiades in Taurus
October 2nd	Aldebaran 1st	Taurus
October 26th	Bellatrix 2nd	Orion
October 30th	Castor 1st	Gemini
October 30th	Betelgeuse 1st	Orion
November 4th	Pollux 2nd	Gemini
November 4th	Rigel 1st	Orion
November 27th	Procyon 1st	Canis Minor
December 4th	Sirius 1st	Canis Major
December 8th	Phaet 2nd	Columba
December 14th		The Bee Hive in Cancer
December 16th		The Head of Hydra

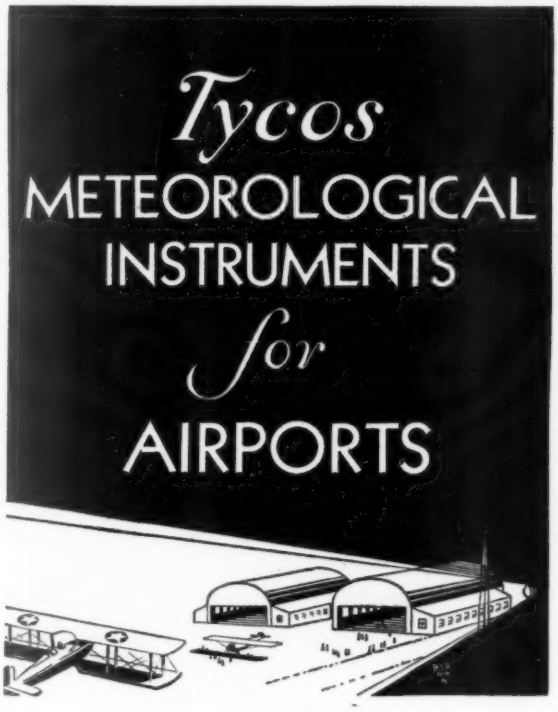
With the aid of Charts Nos. 1 to 4, the position of 28 conspicuous constellations and also five others that contain very bright stars can be obtained for every month in the year. To use these chartlets, face south and hold chart over your head. To get the position of stars at other hours than those indicated, it is only necessary to take into account the apparent diurnal motion of the heavens.

Once a beginning is made progress will not be found difficult. Study the charts and tracings first, then if possible get someone who is familiar with the stars to give an hour or two a week. If no one can be found who has the necessary knowledge and the time to spare, make copies of the tracings and take them and an electric torch along with you and get busy.

Having acquired a good general knowledge of the stars, the next thing to do is to beg, borrow or steal a sextant. Bubble sextants are expensive and comparatively few are available. A marine

[*Continued on page 80*]

Meeting Government Requirements for Accurate Weather Knowledge



"ALL airports, whatever their size, should be prepared to furnish information about the weather."

This is a familiar statement to airport owners and managers, taken from the Department of Commerce bulletin "Notes on Airport Management" and part of an article saying that minimum information should include the wind velocity, temperature and barometric pressure. Records of humidity, maximum and minimum temperatures, and rainfall are given as desirable.

TYCOS Instruments for airports fulfill these requirements. Seventy-eight years experience manufacturing fine instruments has given Taylor Instrument Companies an enviable reputation for high grade products. TYCOS weather instruments are used by the U. S. Weather Bureau, U. S. Navy, U. S. Army Air Corps, and leading airports. TYCOS weather instruments are made of the finest material, built by skilled mechanics, and tested and retested to insure their accuracy.

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FLIERS WHO FOLLOW THE SUN [*Continued from page 36*]

the air for a card game. All accepted the invitation and for several hours one delightful afternoon, Mrs. Gilman was hostess to two tables of bridge at an altitude of 5,500 feet. Tea and other refreshments were served in the land of the sky before the party descended once again to the level of motor and motor boat travel. The "society plane," piloted by Captain O. N. Goodsell, cruised over Miami, Biscayne Bay, the Gulf Stream and the Florida keys during the afternoon's entertainment which lasted for several hours. Her initial bridge party high up in the empire of ozone was so successful that several weeks later, Mrs. Gilman staged a second party. Subsequently, other social celebrities in Florida and California followed her ingenious lead.

It is a far cry from climbing the sky's mythical stairway in order to play cards to diving into the sea from an airplane in order to make scientific studies of the marine life of Davy Jones' locker but, notwithstanding, this is another unusual conquest consummated in South Florida recently.

Professor F. W. Pearson, in charge of the zoology department of the University of Miami was a member of the notable Beebe scientific expedition which some months ago explored the wonders of the Sargasso Sea. As a result of that trip which contributed interesting data to the annals of modern scientific exploration, Professor Pearson conceived the novel idea of using the salt waters along the Florida Keys as a submarine laboratory where his students might study marine life in its native habitat.

Florida students who live in a state which has the longest ocean front [it covers some 1,500 miles] of any state in the union and which has more than 30,000 inland lakes within its borders, are experienced swimmers. The dozen members of the zoology class which Professor Pearson first chaperoned by boat on the sea diving trip were adept natators. Parents readily gave their consent, knowing that their sons and daughters were safe in the care of the university professor on such an excursion.

A trio of regulation diving helmets were used during the first trip to the Florida keys. The professor and the students wore ordinary bathing suits for their descents, three persons going down at a time. The diving helmets with their supplementary air lines enabled the wearers to breathe easily at depths of from 10 to 25 feet below the surface and to observe the wonderful tropical fish and other marine life, which habitate the coral reefs and keys, through the glassed peep holes in the diving helmets.

Bimini, a British island, which is rich in salt sea life and which is located 45 miles from Miami, was ultimately chosen by Professor Pearson as the goal of a more pretentious zoological research trip. A large tri-motored seaplane was used as a reliable transport for that trip. It was one of the first occasions in the history of aviation that a plane was employed both as a means of locomotion and also as a substitute diving boat. The amphibian on arrival off Bimini was moored temporarily at various points along the coast while the amateur student-divers made descents directly from the flying machine into the deep sea. Another scalp of achievement in the conquest of the air and the study of the sea was thus taken in bizarre manner.

Future years, so the story goes, will see several hundred American athletes who migrate annually during the winter months to Florida for baseball training, traveling by airplanes owned and operated by their respective clubs. Last spring eighteen major and minor league ball clubs trained in the land of our last frontier. Several of them used club-owned motor busses in touring the peninsular state during their practice game season. The other teams traveled by public conveyances during the "grapefruit league" play time.

Several of the major league owners when queried concerning the feasibility of airplane travel for big league baseball players were favorably inclined toward that form of transportation. Travel by rail—"the rattlers," in baseball jargon—has long been a bugaboo with the professional players, particularly during the torrid summer weather which frequently occurs both in the Middle West and East. Long jumps and disagreeable traveling conditions by rail have aided measurably in robbing many promising teams of prospective pennants. The outstanding objection which several of the club owners raised to air travel concerned the safety factor. However, that obstacle will surely be hurdled successfully in the potential progress of private and commercial aviation. Baseball will benefit immeasurably from the signing of air travel as a potential prized assistant.

It will not be long before big league baseball's yearly trip to Florida training camps will be signalized by the use of comfortable commodious airplanes as space annihilators. "Babe" Ruth, Grover Alexander, "Dazzy" Vance and their mates will join the class of flying sportsmen now in its infancy.

The New York "Yankees," for example, instead of riding approximately 35 hours on an uncomfortable train in the spring training junket from New York to their training camp at St. Petersburg will make the trip cloudland style between dawn and dusk of the same day. The Chicago "Cubs," who now spend some 80 hours in the railroad journey from the Middle West to their Catalina Island camp in California, will fly there in less than one-quarter of that period. All of which will promote increased baseball efficiency and better morale among the players.

The army of professional golfers which tours the Pacific Coast, the Southwest and Florida during the winter months when northern links are swaddled in snow and frozen terrain, is also inclining favorably toward fleet airway travel as the ideal means of going from here to there and elsewhere. For the "pros" who have accumulated prosperity from the ancient and honorable game of golf, the maintenance and operation of private airplanes is good business both from a publicity and "ease of travel" viewpoint. Established professionals like Walter Hagen, Horton Smith, Tommy Armour, Gene Sarazen, Leo Diegel, Jim Barnes and Johnny Farrell can afford airplanes and potentially plan to have such "winged" equipages for their tours.

Tommy Armour and George Von Elm, amateur linksman who ranks next to Bobby Jones on the American roster, cruised by air recently from Detroit to Pebble Beach, California, where the national amateur golf championship was played early in September. This jaunt by skyland route was made in less than one-fourth the interval required by the fastest transcontinental train and gave Von Elm, who competed in the tournament, that much more time for practice on the links where the championship matches were played.

Golfers and airplanes are teaming up as agreeable partners more and more every day. The plane reduces the trip from the city to their favorite country club to a fraction of the time required by other methods of transportation. Golf clubs which speckle the American terrain, appreciating the popularity of air travel among their members, are providing landing fields and even hangar facilities close to the links sidelines where the music of clean-hit balls is the sweetest which delights golfing ears.

A case in point of what air transportation means to the golfer is afforded by the Manor Country Club, one of the first near our National Capital to establish a flying field. The average businessman can drive his automobile from his downtown office to the nearest flying field, hop into a plane and arrive at this golf club 20 minutes after he closes his office door despite that the distance is 14 miles. The best time by motor car where the speed laws are obeyed is 35 minutes.

"Supremely safe"

IN AMERICA
WHITTELSEY AVIAN

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—pilots in 16 different countries say this of the Avian

BUILT 8 times strong enough to resist the strain of normal flying . . . *equipped* with the most recent of safety developments . . . *tested* for its power and dependability on many a world's record flight!

But convince yourself of the Avian's outstanding air-worthiness. Hop into its comfortable cockpit and give it the gun. You'll take-off in a few yards and zoom right up into the blue. Then point toward the distant horizon and wing for it! . . . that tireless, air-cooled Cirrus motor purring out the miles by minutes tells its own story of reliability.

Now bank . . . now barrel-roll . . . now climb into a loop and stall . . . have no fear of the dread spin, for those Handley-Page wing slots stabilize the plane in half a turn.

Your port is any fair-sized clearing, for the Avian sets down on its shock-absorbing split-axle undercarriage at 35 m. p. h.

With the price only $4995 flyaway or f.o.b. Bridgeport, and with a gallon of gas yielding 20 miles of travel, any man of moderate means can afford to fly an Avian. For detailed information write to the Whittelsey Mfg. Co., Bridgeport, Conn.

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When you fly or sell the Whittelsey Avian you have something to talk about. No other light plane has such a record of performance . . . or the equipment. National distribution of the Whittelsey Avian is being completed in the leading aviation centers of the country. Dealers and distributors are still being appointed. Write for further information concerning our sales plan. We will gladly send you the detailed story of the plane itself. The Whittelsey Manufacturing Company, 230 Howard Ave., Bridgeport, Connecticut.

WHITTELSEY AVIAN

THE OUTSTANDING SPORT AND TRAINING PLANE OF THE WORLD

LANDING AN AIRPLANE BY PARACHUTE

[*Continued from page 27*]

The basket was of heavy fabric webbing strips around a flexible steel frame. To load the parachute into the compartment, it was folded on top of its connecting cables in the center of the carrier which was then placed on top of the springs. Over the whole was placed a cover of ply-wood shaped to conform with the wing curve. In the cover were openings to fit over spring-locking devices. Thus in place, jack-screws were brought into use and the whole forced down into the compartment, until the coil-springs were sent down to be caught by the triggers which held them until released by the pilot.

The trigger release was mounted on ball bearings to eliminate as far as possible all friction and afford a quick release. Connected with the springs were six synchronized levers attached to a cable running down the inside of the right center strut to the pilot's cockpit. The cable was attached to a lever on the instrument board. To release the parachute the lever was moved from left to right and the six springs were released simultaneously. At the same moment, the trigger released the fastenings on the cover of the compartment. The force threw the parachute well clear of the plane thus avoiding possibility of entanglement with the rudder.

The parachute may be of any standard make and of size in proportion to the weight of the plane and load. The one used in my test at Santa Ana, California, was a Russell Valve type, 60 feet in diameter with an effective lift of 1,600 square feet. It was made of the heaviest parachute silk and had 60 silk shroud lines, each of 400 pounds tensile strength. Each shroud line measured 60 feet from lip of the parachute to the Dee rings, of which two were used, this precaution to help stop oscillation of the parachute.

The airplane was attached to the shroud lines from the parachute by four flexible cables running from the bottom longerons at the two main stanchions up through the wing. Between these cables and the shroud lines of the parachute a connecting link was so arranged that it could be released by the pilot on landing —this to provide against the plane being dragged in case of strong wind.

Two days before the exhibition test a preliminary one was made from a straight flying position with the motor turned on. A load of papers of the weight of the parachute was used. From that test I saw that there was danger that the huge parachute, much heavier than the individual pack, might envelope both the tail and pilot's cockpit and render escape impossible. To reduce this danger to a minimum I had the extra steel cables added to get more distance between the plane and the shroud lines. The extra length of cables was used for the first time in the exhibition at Santa Ana.

At this test a three-place biplane was used. So far as the spectators could see it was the regulation biplane as there were no visible evidences of the parachute. I circled over the airport gaining altitude, also making observations as to wind currents and possible drift.

After a few maneuvers I selected the most desirable position and pulled the release lever at the same time side-slipping the plane a little. Hurled by a 12,000 pound force the great parachute came out of the compartment thrown well clear of the tail. It took form almost instantly bringing the plane into a combination loop and wing-over at right angles to the arc of the parachute-pulling shroud-lines, and the mammoth billows of silk settled down slowly earth-ward with plane and pilot.

E. H. Dimity, head of the Aircraft Safety Equipment Corporation, says, "All manufacturers of airplanes, for all purposes, are using every effort to provide the greatest possible safety. The greatest drawback to air travel today is fear on part of the public. Once this is overcome, they will all take to the air as they have during past few years to automobiles. I believe that the day is near at hand when every passenger plane and postplanes as well will be equipped with a built-in parachute, either the same or along the lines of the one used by Captain Turner in his experiment at Santa Ana. This is the day of progress in aircraft."

THE PUBLISHER'S QUILL

[*Continued from page 11*]

should provide one great exhibition a year held under auspices and conditions conducive to sales instead of glory.

THE MATTER OF LOBBIES

WE pointed out long ago that the great value of a unified air service in peace time was the active lobby which is the inevitable result of unified strength. When the newspapers last month discussed the rumor that the Government was considering the scrapping of the Five Year Program adopted by the Morrow board, a unified service would have had the strength to fight bitterly against this deadly blow to American Aviation. The active assistance given to flying development is small enough now without chopping it out altogether.

At the first sign of economic necessity, or a cut in appropriation, as Mrs. Robertson ably points out elsewhere in this issue, the old tradition in each service rallies, and where possible, Aviation carries the brunt of the cut.

A unified air service and ministry, with fealty to no tradition save its own, would fight each step of the way for everything that meant progress and national safety from the viewpoint of aircraft.

Outside of the lobby which the navy itself maintains in Washington comes news of an alleged ship-builders lobby. It is stated that a man named Shearer was paid huge sums of money, and that the job he was paid for was to disseminate propaganda to create international distrust and more battleships. This, if true, is particularly unfortunate. It can only be regarded as an unwholesome influence the general object of which is the hogging of all appropriations irrespective of national good.

Against forces of this sort aviation is helpless. It must carry on as best it can, like a poor relation.

The facts in the case are clear. Modern flight is the greatest development in civilized times and if given proper support will revolutionize war, transport and even population distribution. The nation which rules the skyways will be the nation which is greatest commercially and most formidable in war.

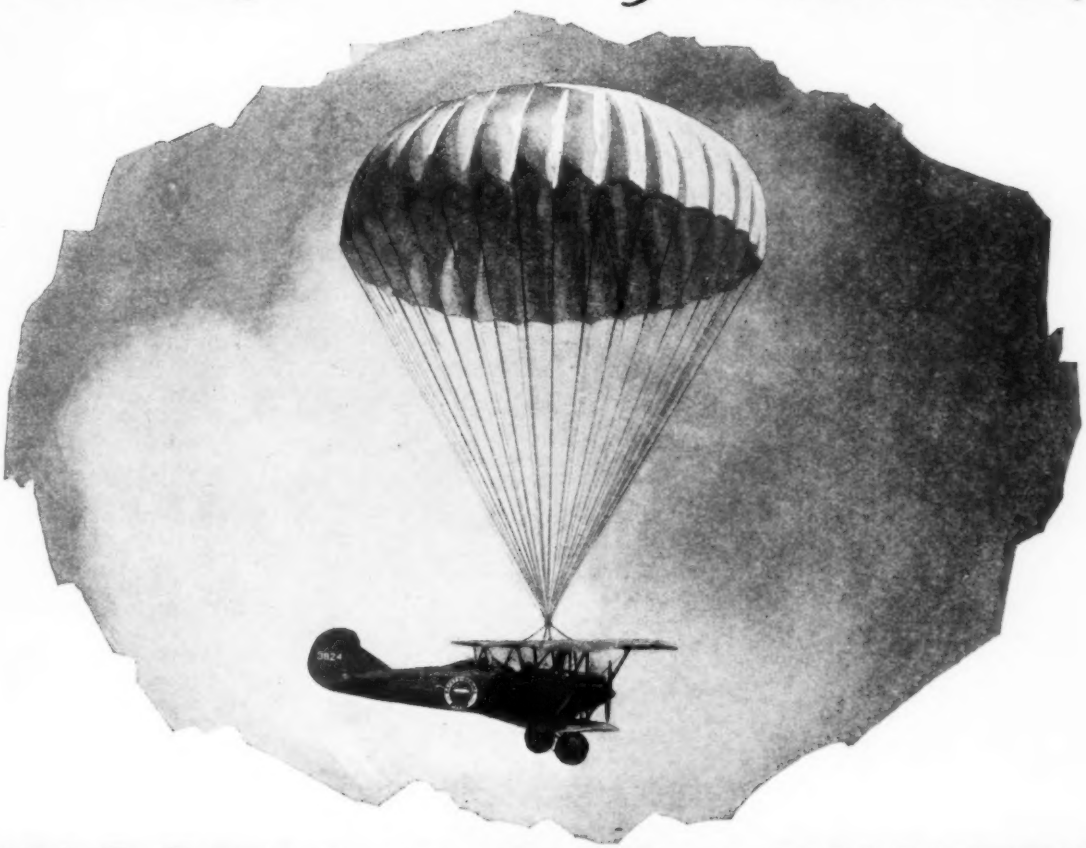
This development is by its very nature costly, but not as costly as building battle cruisers which in a few years will be practically obsolete and ineffective. Every dollar spent for aerial progress is a dollar spent for American commercial supremacy and national safety.

Under our elective propagandist system attention is only given to vital well-organized movements. A good and wholesome contention can get nowhere without aggressive unity, more especially if its needs require the spending of money.

In the meanwhile, ironically enough, aviation receives a ridiculous amount of support considering its importance from both a future commercial and national defense angle, and not an awful lot is done about it.

Friends of a single air ministry should take steps to advise their congressmen of their opinions in the matter. The subject will be strongly advocated by several leading congressmen at the next session, and an impressive showing of strength now will be effective.

The "Lifeboat" of the Air!



RUSSELL Valve PARACHUTES

FOR LOWERING ENTIRE AIRPLANES AND FREIGHT

Used In

SUCCESSFUL DEMONSTRATIONS

By CARL OLZE

At Inglewood, California, in 1926

and

By CAPT. ROSCOE TURNER

At Santa Ana, California, in 1929

It is believed by a number of leading aeronautical experts that these large parachutes, "the lifeboats of the air," will soon be used to lower entire airplanes, or detachable cabins from large airliners, containing passengers or valuable freight.

The Russell "Valve" Parachute is the only parachute of large size that has, thru several successful demonstrations, proved its ability to open quickly enough for practical results in lowering entire airplanes or loads of passengers and valuable freight.

Like the Russell *"Lobe"* Parachute, for personal use, the Russell *"Valve"* Parachute represents the very latest development in modern parachute construction.

A patented valve feature in this parachute causes air to rush in thru the side walls as well as thru the mouth of the skirt of the parachute—giving exceptionally fast openings for parachutes of large size.

Russell "Valve" Parachutes are manufactured in sizes up to 100 feet in diameter. Parachutes of this type, 50 feet in diameter, will lower 3,000 pounds. The 60 foot Russell Parachute will lower 5,000 pounds, while the 100 foot Parachute will lower loads in excess of 10,000 pounds. These parachutes are made of silk, pongee silk or cotton, on special order only. Prices and information on request.

RUSSELL PARACHUTE COMPANY

Manufacturers of Russell "Lobe" Parachutes for personal use and Russell "Valve" Parachutes for lowering heavy loads

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 [*Continued from page 42*]

at the same time the diving moment of the propeller thrust about the center of gravity disappears, and the machine is not likely to dive steeply.

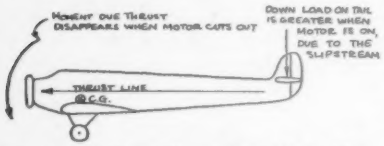

MOMENT DUE THRUST DISAPPEARS WHEN MOTOR CUTS OUT
DOWN LOAD ON TAIL IS GREATER WHEN MOTOR IS ON, DUE TO THE SLIPSTREAM
THRUST LINE
C.G.

Fig. 8. Showing thrust line above C.G. *Note:* Plane not greatly affected by cutting out of motor.

Flying boats are apt to have a very high thrust line, because designers like to keep the propeller clear off the water, and because with a pusher propeller the engine has to be put above a monoplane wing. A typical case of high propeller thrust is illustrated in Figure 9. In such a case the down load on the tail surfaces has to be very high to counteract the large nosing over couple of the propeller, and when the engine fails, the flying boat is apt to stall. Stalling when the engine fails is a worse condition than going into a sharp dive.

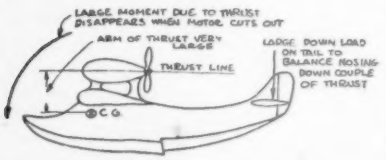

LARGE MOMENT DUE TO THRUST DISAPPEARS WHEN MOTOR CUTS OUT
ARM OF THRUST VERY LARGE
THRUST LINE
LARGE DOWN LOAD ON TAIL TO BALANCE NOSING DOWN COUPLE OF THRUST
C.G.

Fig. 9. Flying boat with thrust line very much above C.G. *Note:* When motor cuts out plane tends to nose up.

It is very difficult to avoid a difference in balance conditions with change from "power on" to "power off" because there are so many different factors to compromise.

A rough rule is that the thrust line should either pass through the center of gravity or that the thrust line should be a few inches above the center of gravity, so that the disappearance of the propeller thrust couple more or less balances the decrease in the stalling moment, of the tail surfaces, when the slip stream disappears.

Position of the thrust line far above the c. g. or far below the c. g. should be avoided.

Effect of Parasite Resistance on Balance

IN considering longitudinal balance and stability we have apparently neglected all other aerodynamic forces than those acting on the wing and tail surfaces. This is because parasite resistance (drag of fuselage, struts, landing gear, etc.) is apt to act fairly close to the center of gravity, and also has far less magnitude than the lift forces on the wing.

It is only in extreme cases that the resistance of certain parts has much effect on the balance. For example, if two large pontoons are placed well below the center of gravity, their aerodynamic drag will then change trim because their drag will evidently introduce a nosing over couple.

The writer has been frequently asked whether the retraction of the chassis in a land plane will affect the balance very much. Simple calculation shows that it will not. A very slight down motion of the leading edge of the stabilizer will be sufficient to give precisely the same trim with chassis withdrawn as with chassis down.

Full Flight Test of Stability

IT is very easy to determine in full flight whether an airplane is stable or not.

Suppose that by the use of the adjustable stabilizer, the plane is perfectly trimmed for cruising, so that it can be flown hands off.

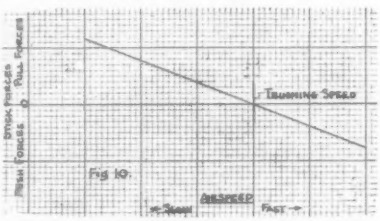
Push the stick forward, then release. The plane should nose down at first, oscillate once or twice and then return to its original position.

If the stick is pulled back, then released, the plane should nose up, oscillate once or twice, and then return to its original position.

Another test for stability of a more quantitative character is to use a simple spring stick force recorder.

With the ship trimmed for a certain speed, the recorder should show "push" forces on the stick for higher speeds, "pull" forces on the stick for lower speeds.

The character of the "push" and "pull" forces it is desirable to have is shown in Figure 10.



Curve of stick forces desired in flight tests.

IN the previous article we explained the distinction between static and dynamic stability, with analogy of an oil damped spring.

Static stability for the airplane can be achieved by providing a sufficient tail moment arm, either by small surfaces placed at the end of a very long fuselage, or by large surfaces placed at the end of a short fuselage.

If a machine is short coupled, however, and provided with large tail surfaces it may be statically stable but not dynamically stable. When displaced from its position of equilibrium, it will oscillate rapidly and perhaps violently about the position of equilibrium, and will take a comparatively long time to settle down.

If on the other hand a plane is equipped with a long fuselage and somewhat smaller tail surfaces, it will be not only statically stable, but also dynamically stable. The tail surfaces will act as a species of "feathering" mechanism, damp out the oscillations quickly and give an easy riding machine.

Practical Methods of Correcting for Longitudinal Instability

WITH the technical knowledge now available and with such apparatus as the wind tunnel at our disposal, there is no excuse for designing a machine of longitudinal instability. However, if a pilot does find longitudinal instability present, the corrective measures are fairly clear.

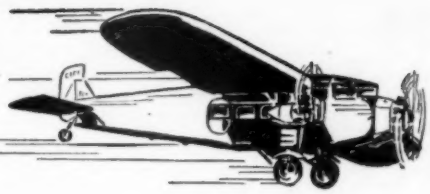
The most powerful corrective measure is to move the center of gravity forward. We have seen what an enormous influence the position of the center of gravity has, and if the center of gravity can be pushed forward till it is about at 30 per cent of the chord, remarkable improvement will appear in an instable machine.

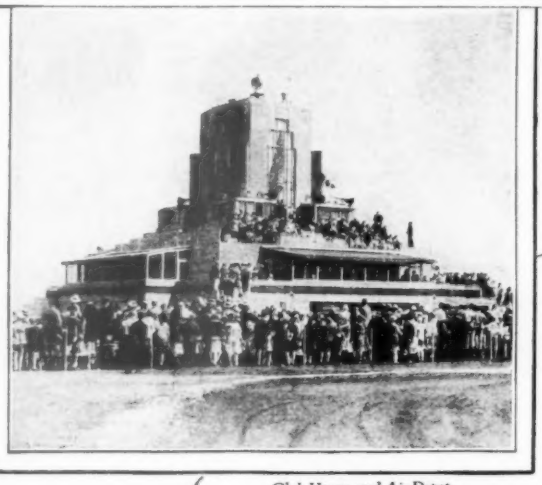
It is of course easier to enunciate this rule on paper than to put it into practice. Changing the position of the center of gravity may mean redesigning the whole machine.

Therefore the designer may resort to increasing the tail surface moment, which depends on the product of the tail arm by the tail surface area. To increase this product, the designer may (1) increase the length of the fuselage or (2) increase the area of the tail surfaces or (3) compromise and increase both the length of the fuselage and the tail surface area. Which is the correct procedure depends on a great many factors, and the problem is somewhat too advanced for full consideration here.

Another possibility is to keep the same moment arm and tail surface area, but to increase the aspect ratio of the tail surfaces by lengthening their span and narrowing the chord (this of course may introduce structural difficulties). As will be shown in a later article the lift of an airfoil increases more rapidly with increase of angle of incidence when the aspect ratio of the airfoil is greater. The machine departs from the equilibrium

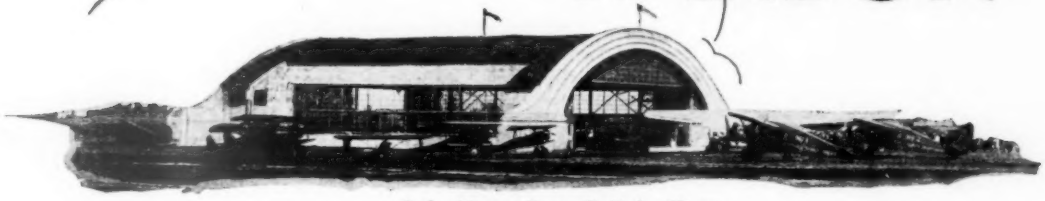
[*Continued on page 96*]





Club House, and Air Depot, Sky Harbor, Chicago

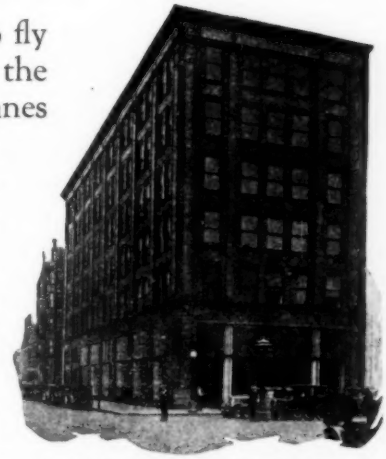
FLY AT SKY HARBOR



Steel and Concrete Hangar, Sky Harbor, Chicago

NOW is the time to get into aviation—learn to fly at Sky Harbor, the finest flying field in the Middle West. Training on latest type training planes with air cooled motors similar to those used in the Army. Advanced training on Fokker and Trimotored Ford. We fly at Sky Harbor all winter.

Complete mechanic's courses covering every phase of aerodynamics taught at our big down town building—six floors of equipment—the finest ground school in the Middle West. Training given on latest types of motors, including whirlwind and other air cooled radials. Welding, navigation, meteorology, construction, and motors are included. Mail the coupon today for complete information. Be sure to investigate Sky Harbor before you pick your flying school.



Sky Harbor Flying School—Six Floors of Equipment

SKY HARBOR FLYING SCHOOL
DEPT. AN
1801 S. MICHIGAN AVENUE CHICAGO

SKY HARBOR, DEPT. AN
1801 S. MICHIGAN AVE., CHICAGO, ILL.

Please send me complete information on the course checked below:

- ☐ Private Pilot's Course.
- ☐ Transport Pilot's Course.
- ☐ Complete Airplane Mechanic's Course.
- ☐ Limited Commercial Pilot's Course.
- ☐ Welding Course.

NAME .....

ADDRESS .....

TOWN ..... STATE .....

BRIEF NOTES OF THE MONTH [*Continued from page 46*]

vious record was set June 21, 1928, with 42 planes and 282 passengers.

Tests are underway for the start of future service between Europe and South America by the Luft Hansa. The "Doctor Eckener," largest and newest seaplane of the Romar type, is the keystone of the experiments.

Confidence in the future development of a trans-Atlantic air route by way of Faroe Islands, Iceland, Greenland and Labrador was expressed by the Rt. Hon. Sir Eric Geddes in Montreal. Sir Eric is chairman of the Imperial Airways, Ltd.

Berlin and Frankfort are engaged in private competition for the honor of being the site of the future German overseas airship harbor. The City of Berlin has purchased the former Zeppelin Flying Field, at Staaken.

Considerable more than twice as much merchandise was exported and imported by air from the Le Bourget airport in France in 1928 than the previous year. Value last year was placed at 610,036,000 francs.

Mail transportation by airplane in Sweden increased 125 per cent last year over 1927. Nearly 15,000 passengers were carried in 1928. This was disclosed in the annual report of the Aerotransport Company.

The Egyptian ministry of public works has approved a contract with the Air Survey Company, providing for an air survey of several upper reaches of the Nile. The cost will be 39,975 Egyptian pounds.

Lloyd Aereo Boliviano is now operating six regular airplane routes. Service is chiefly confined to Eastern and Northeastern Bolivia, a region of tremendous potential wealth.

A new Canadian air mail service, between Fort McMurray and Aklavik, Northwest Territory, will be in operation in November.

Sir John Salmond has been appointed chief of the British Royal Air Force, succeeding Air Marshal Sir Hugh Trenchard.

The Latecoere Lines have extended their Buenos Aires to France weekly service westward to Santiago, Chile.

Negotiations are underway for the establishment of a regular Zeppelin line from Germany to Japan.

Quarantine rules have been applied to aircraft entering Canada. These are the same as for ships.

DISTRIBUTORS

Lieut. Ralph W. Snoke has been appointed sales representative of the Spartan Aircraft Co. for Michigan, Indiana, Ohio and Western Pennsylvania. Lieut. Snoke was former chief test pilot of the Hartung Airways, Detroit. C. L. Hussey has been appointed sales representative of the Spartan Company on the coast. He was formerly chief pilot of Aeronautical Distributors, Inc.

Gorman Brothers Aircraft Division of Pennant Industries of Brooklyn has been appointed dealers for metropolitan New York for the Nicholas-Beazley Airplane Co. of Marshall, Mo. An initial order of twelve planes was placed. Dawson-Babcock Aircraft Corp. of Pittsburgh also was appointed distributors for the Barling NB-3. monoplane.

Albert E. Hastings has been appointed sales manager of the San Diego Air Service Corp., distributors of the Fleet planes in south central and southern California. Hastings was graduated from the Airtech School of Aviation.

L. M. Means of Fayette, Mo., has been appointed district sales manager for the American Eagle Aircraft Corp. Mr. Means will manage the Kansas territory and possibly a portion of Oklahoma and Nebraska.

San Diego Air Service Corp., located on Lindbergh Field, was appointed authorized sales and service representatives of the Wright Aeronautical Corporation.

Steel, Inc., Simmons Aircraft Division, has contracted for exclusive export sales rights of all General Airplanes with the exception of the Dominion of Canada.

A. E. Rhode of Rhode Motor Company of Tucumcari, N. M., has been appointed dealer for Spartan airplanes in New Mexico and Arizona.

Jeff Warren of Los Angeles has been appointed distributor for the Nicholas-Beazley Airplane Co., Inc., in Arizona and Southern California.

McMullen Aircraft Corp. of Tampa, Fla., has been appointed dealer for the Great Lakes Aircraft Corp. of Cleveland.

John Van Bruggen of Kalamazoo, Mich., has been appointed representative for the Kysor Eaglerock Company in open territory.

J. Brownlee, Inc., automobile dealers at Shreveport, La., has been named dealer for the Spartan Aircraft Co. of Tulsa, Okla.

Albert Dudek of Niles, Mich., has been named Eaglerock dealer for Northern Michigan.

Charles Toth was recently appointed salesman for the American Eagle Aircraft Corp.

LEGISLATIVE

A total of 250 bills on aeronautical subjects were introduced in the legislatures of 41 states during 1928-29 sessions. Of this number 106 were passed, 65 defeated, and 79 carried over.

Forty cents per half ounce or fraction has been decided upon as the rate for air mail postage between the United States and Venezuela.

PRODUCTION

Declaring that in the Fleet Aircraft plant at Buffalo women are employed almost exclusively for the complicated work of covering the wings and assembling ribs, Maj. Reuben H. Fleet said that they have been found able to "fit the delicate pieces of the structure together more accurately and in less time than men."

The Aeronautical Chamber of Commerce announces that 3,826 airplane motors were produced in the first six months of this year, a 78 per cent increase over 1928. The retail value of the motors was placed at $14,349,375.45. The total value of planes, motors and parts for the six months' period was placed at $50,000,000.

Airplane exports for the first half year of 1929 have more than exceeded the total of exports for all of 1928. Department of Commerce figures show the first six months' figures were $5,174,656, more by $1,509,933 than the total of 1928.

An automatic wind slot which retains lateral control of the plane when its speed becomes so slow that it would otherwise stall is incorporated in a new British airplane which will be entered in the Daniel Guggenheim safe aircraft competition at Mitchell Field. The plane was designed by Frederick Handley-Page.

Exports of airplanes and accessories are steadily increasing, Dr. Julius Klein, assistant secretary of commerce, announces. He accredits this in part to new uses of planes such as dusting crops with insecticides, spraying mosquito breeding ponds and transporting payrolls.

A cotton fabric coated with rubber and other substances has been developed as a substitute for goldbeaters skin for use in construction of gas cells in dirigibles. The cost of the new cells would be cut in half, it is stated.

Boeing Aircraft of Canada, Vancouver, have gotten underway on producing Boeing flying boats, mail planes, and the new three-place Sports model. The Sunday Sun gave over a complete section to herald the opening of the plant.

Detroit Aircraft Corporation has purchased a thirty acre tract at Long Beach, Cal., for erection of a large modern airplane factory. Plans to center all the activities of the Lockheed division of the corporation are announced.

Louis Bleriot has perfected a new type of airplane, destined for a 24-hour trans-Atlantic service. The plane can be automatically converted into a lifeboat in case of forced landing at sea.

Sixteen women are now being employed by Universal's Robertson division, a gain of fifteen in the past year. Many names are on the waiting list, Paul E. Gillespie reports.

A new $40,000 covering and dope plant has been completed and is now in opera-

[*Continued on page 70*]

THERE are 70 square inches available on this page. Only a portion of this space was used. Rather careless, was it not, to ignore the opportunities offered by the remaining unused space? You advertisers of aeronautical commodities and service—are you more efficient? You have something to sell . . . a market to reach . . . are you reaching all your prospective groups of purchasers? Of course you are reaching the aircraft manufacturer, the engine manufacturer—perhaps by mail—perhaps by advertising in a strictly trade publication. An excellent market . . . it should be covered . . . but how about the others? There are railway executives . . . heads of non-aeronautical corporations . . . wealthy sportsmen . . . prospective investors . . . legislators. There are airminded millionaires in India, Canada, South America, and the Orient.

THE FOREIGN MARKET

AERONAUTICS has not neglected these additional markets. A newsdealer in the South Sea islands writes for more copies . . . he was sold out in three days. The Vice Consul in Athens, Greece, writes us that AERONAUTICS is thumbed over with avid interest by American and Greek guests to the consulate. . . . Just a few isolated instances representative of many others.

No doubt you too have these additional markets in mind. But why not actually reach these people with your advertising message?

An advertising program is complete only when it covers its market fully. An advertising program is incomplete when it neglects the thorough coverage offered only through the columns of AERONAUTICS. Full particulars on request.

?

HOW INCOMPLETE IS MY COVERAGE?

DIRECTORY

AEROPLANES

FAIRCHILD AIRPLANES

SPORTSTER
2 place monoplane, $1,600, with Le-Rhone 80. Blue prints, $5.
Descriptive Literature, 10c (stamps).

BARNEY SNYDER
1201 Princeton Blvd. Elkhart, Ind

AIR LINES

Lower fares!
daily . . . over
CALIFORNIA, MEXICO
and THE SOUTHWEST

MADDUX AIR LINES
DEPENDABLE

Grand Central Air Terminal, Glendale, California

SCHOOLS

Flying Instruction for Private or Limited Commercial Pilots' licenses. Preliminary instruction in Wright J6 Challengers.

Sales agents for Fairchild, Challenger and Stearman planes. Also for Fairchild Aerial Surveys. Used planes bought or sold on brokerage basis.

Westchester County's only airport. Operated under Dept. of Commerce regulations. Planes to rent for short or long trips. Planes and pilots licensed.

Westchester Airport Corp. (Barrett Airways), Armonk, N. Y. New York City office, Chanin Bldg., Tel. Caledonia 6188.

Westchester *Airport*

BUYERS' GUIDE

This group of indexed small advertisements will give an up-to-the minute summary of services and products available.

A Star [*] in the copy indicates that another advertisement by the same advertiser appears elsewhere.

[Please see index, page 114]

One inch insertion in this directory is $7.00 one time.

SCHOOLS

FLY LEARN IN NEW 1929 **Wacos**
Complete Ground Course
THREE AIRPORTS
All Equipment and Personnel licensed by U. S. Department of Commerce
GREER COLLEGE
Dept. 10J2
2024 S. Wabash Ave., Chicago, Ill.
★ *WACO AND RYAN DEALERS*

STINSON FLYING — AIRPORT SCHOOL
"Where the best pilots are trained
3006 Pure Oil Bldg. Chicago, Ill.
Examination and Rating by
The Dept. of Commerce Applied for

$8.50 per Lesson
LEARN TO FLY
at our New Airport Nearest to New York City
$8.50 per Lesson
JAMAICA SEA AIRPORT
Rockaway and Springfield Blvds.
Laurelton 0750 JAMAICA, N. Y.

SCHOOLS

THE PERFECT TAKE-OFF FOR YOUR FLYING CAREER
ROOSEVELT AVIATION SCHOOL

A civilian school after the Army pattern: equipment, curriculum, Army-trained instructors. At Roosevelt Field, where Lindbergh, Chamberlin and Byrd hopped from. 45 minutes from Broadway. New building groups, including dormitory for resident students and swimming pool, now in progress. Students carefully selected. Well equipped for ground and flying instruction. *Write* N. J. Boots, Lt. Col., Roosevelt Aviation School, Inc., Mineola, L. I., N. Y.

AIRTECH SCHOOL OF AVIATION
LINDBERGH FIELD, SAN DIEGO, CALIFORNIA
Send For Complete Information
Department of Commerce Approved Transport Ground & Flying School

Write for Free Booklet
LEARN ABOUT OUR ABSOLUTE GUARANTEE
WE USE ONLY
Licensed Planes — Licensed Instructors
Jefferson School of Aviation
Jefferson City, Mo.

Learn to Fly in the West
At a U. S. Govt. Accredited Flying School. Complete instruction from Ground School to Advanced Transport Pilot Special Course
AERO CORPORATION of CALIFORNIA
Operating STANDARD AIRLINES
between
EL PASO—DOUGLAS—TUCSON
—PHOENIX — LOS ANGELES
9401 South Western Ave., LOS ANGELES, CALIFORNIA

DIRECTORY

SCHOOLS (Continued)

FLY WITH US

Our first airplane, three place bi-plane, built by the club, is out flying. Work has started on the second club ship, a two place cabin monoplane. Our method of training and our plan of building are of great advantage to our members.
Members are now receiving instruction in their own plane. Dual instruction $10 an hour. Solo $5 an hour.

Only a limited amount of Life Memberships open.

EDGEWATER FLYING CLUB, Inc.

Office; 3410 Montrose Ave. Chicago, Illinois.
Flying Field Cook County Airport 8700 Irving Pk. Blvd.

Eagle Airways

HINCKLEY, ILLINOIS

Formerly Eagle Airport School of Aviation

60 Miles West of Chicago

Learn to Fly at our New Location on the Transcontinental Airway. DeKalb County Airport, equipped for night flying. Transport Pilots, modern equipment, reasonable rates, excellent accommodations. Distributors for Stinson Monoplanes, Air-Kings, and Monocoupes. Write for free information.

If You Want to Learn to Fly

It will pay you to visit Newark Air School—one of the finest air schools in the East—before making your choice. Capt. J. O. Donaldson and Maj. R. L. Copsey in charge. Twelve new planes. Elementary and advanced courses. Department of Commerce rating applied for. Write for catalog.

NEWARK AIR SERVICE

Newark Metropolitan Airport, Newark, N. J. 30 min. from N. Y. C. Tel. Mulberry 1310

PARKS AIR COLLEGE

Parks Airport - - East St. Louis, Ill.

Complete courses for Pilots. Aeroplane and Engine Mechanic's Courses.
Rated by the Aeronautics Branch, Department of Commerce, as an Approved Transport Ground and Flying School. ★

PATENTS

PATENTS—TRADE MARKS

Don't Lose Your Rights To Patent Protection
Before disclosing your invention to anyone send for free blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed.

LANCASTER & ALLWINE
Registered Attys.
471 Ouray Bldg., Washington, D. C. ★
Originators of forms "Evidence of Conception"

MODELS

REPRESENTATIVES WANTED

Do you want to earn money in your spare time by selling model airplanes and supplies?
Complete details on request
Model Airplane Division, Dept. A.

KAHN AIRCRAFT COMPANY
5710 Woodlawn Avenue Chicago, Illinois

School and Training Information

THOSE who intend to learn the joy of piloting this winter may obtain complete information on schools with complete data on all courses available, prices, etc.

State your requirements to AERONAUTICS *School Department.*

No recommendations will be made, but sufficient reliable information will be supplied to enable you to make a suitable selection.

PUBLICATIONS

FLUG

A journal devoted to aeronautics with official statements of the Austrian Ministry of Commerce and Traffic.

Official Organ of the Austrian Aero-technical Society, etc. Notes from all over the world! Subscribers all over the world!

ADVERTISEMENT — SUCCESS!

Subscription foreign: Dollar 2.—

AUSTRIA, VIENNA, III. TRAUNGASSE 11.

Deutsche Motor-Zeitschrift

REVUE SPÉCIALISÉE DE LA TECHNIQUE DE LA LOCOMOTION MÉCANIQUE DES VÉHICULES A MOTEUR ET DES INDUSTRIES CONNEXES

DANS CHAQUE FASCICULE

TABLEAUX de CARACTÉRISTIQUES des nouveaux types de voitures de tourisme, autobus, camions, tracteurs, avions, moteurs d'automobile et d'aviation

Il paraît un Fascicule toutes les 4 semaines (13 par an)
Spécimen gratis sur demande adressée à
DEUTSCHE MOTOR-ZEITSCHRIFT
DRESDE, A-19, Müller-Berset-Strasse, 17

ILLUSTRIERTE

FLUG-WOCHE

Periodical for Furthering Air Travel in the Service of Business and International Traffic

Air Travel-Engineering, Air Travel-Business Air Travel-Policy

Appears Monthly
Annual Subscription Price Mark 28.00

Verlag Fuer Deutsches Flugwesen

Berlin-Lichterfelde, Augustastrasse 18, Germany

AERONAUTICA

MONTHLY INTERNATIONAL ILLUSTRATED REVIEW

Medium of Flying and Aeronautical Construction of Italy

Whatever is of interest in aerial navigation, one may read in this periodical, one of the most valuable and most widely circulated of the aeronautical publications. Subscription: one year 150 lires.
Sample copy 10 lires.

AERONAUTICA, VIA GESU, No. 6
MILAN (ITALIE)

SUPPLIES and PARTS

School Motors

All types, priced very low. Also magnetos and parts, engine parts, propellers, etc.
One Curtiss C6 Motor in parts $265.00. Ideal to use for experimental 6 cyl. aircooled.

SPILLANE & CO.
4513 So. Main St., Los Angeles, Calif.

WIND CONES

Non-Fouling, standard size and cloth, complete with pipe mounting, ready to hang or light.
Plain white (Two for $10.00) ..... **$ 6.00**
Electric lighted, white (For night) **$15.00**
(Guaranteed sun-fast orange, $3 extra)
25 ft. rubber handle extension cord sets ... **$ 3.00**
Immediate shipment anywhere, write or wire

AMERICAN EQUIPMENT COMPANY
5958 Washington Boulevard Chicago

Your Airport in the South

Everything aeronautical...16 branches serving the entire south. Aircraft, aero supplies, airport construction, aeromotive service.

SAF

Southern Aeromotive Service, Inc.
Division of Southern Air Transport System

The TUBULAR AIR-CRAFT CORP. WIND TUNNEL

is now open for private individuals desiring to determine the worthiness of their patents or inventions dealing with Airplanes, Helicopters, Ornithopters, etc. Actual flying models, wind tunnel and demonstration models made. For further information write

TUBULAR AIR-CRAFT CORPORATION,
Laboratory,
1125 Farm Road, Secaucus, New Jersey

LIGHT RIGHT ON "TITE-SOD"

AIRPORT FIELD SEED MIXTURES

They Wear and Don't Tear.

HALES & HUNTER
CHAS. A. HEATH
Chicago, Ill. Manager Seed Dept.

SERVICES

Newspaper Affiliations Confidential Investigations

JOHN SCHRAM
PUBLICITY COUNSELLOR
Personal and Business Bureau
Advertising — Publicity — Personal Service
1857 East 19th St. Phone: PRospect 1128
CLEVELAND, OHIO

RICHARD V. MURISON
ARCHITECT
Specializing in the Architecture of Aviation. Buildings—Airport Planning — Consulting
343 S. Dearborn St., Chicago, Ill.

BRIEF NOTES OF THE MONTH [*Continued from page 66*]

tion at the factory of the Nicholas-Beazley Airplane Co., Inc., of Marshall, Mo.

California Propeller Co., formerly of Los Angeles, has opened a factory in Marshall, Mo. The company manufactures a Japanese birch propeller.

Construction of a "fool proof" airplane that will not stall or spin is claimed by the Gates Aircraft Corporation.

Fourteen new type airplanes have been approved by the aeronautics branch of the Commerce department. The approved planes are Cunningham-Hall, Alliance-Argo, Parks, Timm Collegiate, Lincoln, Curtiss Fledgling Junior, Boeing, Command-Aire (2), Swallow, Stearman, Travel-Air (2) and Alexander.

SCHOOLS

Because of the large number of qualified candidates for appointment as flying cadets in the army school, the department of war has announced that only college graduates will be selected unless others come in higher preference groups by virtue of service in the army or national guard.

A new course in Physics of the Atmosphere is being given at the University of Southern California, Prof. Arthur Nye, head of the department of physics, announces. The course was planned to be of special interest and value to the aviator, both prospective and experienced.

Ground School Superintendent Fred Snavely of The Braley School of Flying made an innovation in the study and instruction on parachutes at the school. The class will make and flight test its own chutes (with dummy) as part of the training.

Three regular courses in Problems of Aeronautics in the Schools and one advanced course have been inaugurated by New York university in cooperation with the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education.

University of Wichita may be selected as one of the institutions needed to draft a code of standards by which airplane performance might be measured. The Aeronautical Chamber of Commerce is in charge of the appointment.

War against fake schools of aeronautics has been launched by the Chicago Better Business bureau. Flint Grinnell, manager, says such institutions are taking thousands of dollars from ambitious youths in Chicago.

New York University announces a special intensive course for the training of teachers for aviation ground schools. The course is being offered through the cooperation of the Guggenheim Fund.

The first women's classes in flying instruction in the world were opened by Curtiss Flying Service at South Building, New York University.

GLIDERS

The Cook Glider and Soarplane company has moved its factory to 424 W. 6th Traffieway, Kansas City, Mo. In the new location, two floors will be occupied with the manufacturing and school equipment.

Six glider pilots from Long Beach, Riverside and San Diego took part in the first Pacific Coast Glider meet in San Diego. Thirty-seven flights were made.

PERSONALS

Earl J. Smith has been appointed assistant to the president and chairman of the public relations division of the Stinson Aircraft Corporation, Detroit. Mr. Smith was formerly vice president of the American City Bureau, New York and Chicago. He estimates that air traffic congestion will not be reached until there are more than 69,608 planes trying to crowd their way into the sky above one square mile.

Officers elected at the annual meeting of the Manufacturers Aircraft Association, Inc., in Cleveland included President Frank H. Russell, Garden City, N. Y., Vice Presidents J. Don Alexander, Colorado Springs, Colo., and Harris M. Henshue, Los Angeles, Cal., Treasurer E. S. Evans, Detroit, Secretary Walter C. Davis, Richmond, Ind., Assistant Treasurer, Assistant Secretary and General Manager S. S. Bradley, New York.

North American Aviation, Inc., recent purchaser of the Pitcairn Aviation, Inc., will keep Ralph S. Westing of the Pitcairn company in charge of general business, publicity and accounting departments. Lieut. Harold A. Elliott will continue to direct the operations for the air mail line.

Edward S. Evans, president of the Detroit Aircraft Corp., which has taken over the Parks Air College, announced during a visit that the college would continue as before to be under the direction of Harry P. Mammen, president, and Oliver L. Parks, vice-president.

Thomas L. Colby, manager of the aviation section of Berry Brothers of Detroit, completed a 2,000 mile business trip in his Great Lakes Sports Trainer at a total cost of $105. Mr. Colby, who kept a careful check of expenses said the $105 covered gasoline, oil, airplane storage, hotel bills and other items for himself.

Flying 10,000 miles on business and covering territory in five weeks which would ordinarily take five months, E. B. Filsinger, vice president in charge of foreign sales of the Royal Baking Powder Co., and Pilot R. R. Bently arrived in Berlin from Johannesburg, South Africa. The plane used was a Star Moth.

Gerald C. Gross has been directed by the Federal Radio Commission to study current European practices with respect to radio communication for aviation. Mr. Gross left for Europe to attend the meeting of the International Consulting Technical Committee on Radio Communications.

Lieut. Commander Clinton Havill, chief of the propeller section of the navy bureau of aeronautics, has resigned to become director of research for the Bendix Aero Corporation, East Orange, N. J. Last year, Commander Havill won the Wright Brothers' medal for his paper on "Aircraft Propellers."

Roscoe Vaughan, manager of the Continental Illinois Co., Wichita, Kas., and vice president of the National Aeronautic Association, joined a commission of representatives of air lines, railroads and hotel associations in Paris. The commission inspected leading airports.

Harvey J. Stoneburner, formerly in the aeronautics branch of the department of commerce, has been appointed chief engineer for the American Eagle Aircraft Corp. of Kansas City.

Edward H. Sharpe has been appointed director of public relations for the Aviation Corporation, E. W. Clapp, traffic manager at Chicago, announces. Mr. Sharpe was formerly with the Southern Pacific.

Bert Mackie, Boston, pilot for the Waco Aircraft Co., recently broke the record for outside loops by performing seven. The record formerly was three, held by Charles "Speed" Holman.

Prof. Horace W. Stunkard, head of New York University department of biology, declares that the noise of airplanes will not impair hearing.

Twenty-five sport Trainers, combination training and sport planes, have been purchased by Sioux Skyways, Sioux Falls, S. D., from Great Lakes Aircraft Corp. of Cleveland, Col. Benjamin F. Castle, president announces.

Ensign Norman Anderson, naval flyer and formerly an instructor at Great Lakes, has been named head of the airplane and engine department of the Parks Air College ground school.

James Work has been appointed vice-president of the Detroit Aircraft Corporation. Mr. Work was chief engineer of the naval air station at Lakehurst from 1922 to 1926.

H. F. Lusk, dean of the Boeing School of Aeronautics at Oakland, has been appointed a member of the flying school committee of the Aeronautical Chamber of Commerce.

Milton Lerner, former directory editor of Air Transportation and Airports, has been named aviation editor for Universal Trade Press Syndicate.

Carl Ben Eielson has been appointed executive head of Alaska Airways, Inc., subsidiary of the Aviation Corporation.

Louis D. Strickler is the youngest licensed pilot in the United States. He is

[*Continued on page 72*]

MR. CHAIRMAN !

"After Investigation I Recommend"—

YOU MIGHT BE A RAILWAY EXECUTIVE AT A BOARD MEETING . . . . CALLED TO DISCUSS THE PURCHASE OF A FLEET OF AIRPLANES . . . . OR ONLY A MILLIONAIRE SPORTSMAN WHO WANTS . . . . TO BUY A PLANE TO GET TO CUBA . . . . IN AN AWFUL HURRY. . . . .

. . . . but

IN EITHER CASE . . . . YOU WILL WANT TO WRITE TO AERONAUTICS TO GET FULL PARTICULARS . . . . PERFORMANCE . . . . PRICE . . . . EQUIPMENT . . . . SPECIFICATIONS . . . . OF THE PLANE YOU WISH TO PURCHASE. OUR OPINIONS AND FULL PARTICULARS . . . . WILL BE SENT UPON REQUEST TO THOSE WHO ARE CONTEMPLATING . . . . THE PURCHASE OF A PLANE. NO CHARGE, OF COURSE. . . . .
THANK YOU!

American airplanes costing up to $9,000*

PRICE	MAKE
	Vance
	Heath
	Storms
	Irwin
	Guardian
	Bat
$1,000	
	Prest Pursuit
	Flying Dutchman
	Allison Coupster
	Allison Trainer
	Whitey Sport
	Trella
	Monoprep
	Monocoupe
	Airmaster
	Starwing
	Pheasant
	Watkins
	Cardinal
	Davis
	Cavalier
	Birdwing
	Doyle
$3,000	
	Starling
	Hurd
	Lone Eagle
	Waco
	Parks
	Driggs-Skylark
	Monarch
	Kari-Keen
	Bird
	Command-Aire
	Golden Eagle
	Arrow
	Aeromarine-Klemm
	Aeromarine-Klemm
	Coffman
	Overcashier
	Barling
	Tahoma
	Swallow
	Waco
	U. S. Air-istocrat
	Great Lakes Trainer
$4,000	
	Curtiss Robin
	Eaglerock
	Waco
	Swallow Trainer
	New Standard Trainer
	Tahoma
	American Eagle
	Argo
	Moth
	Arrow
	Fairchild KR
	Cruizaire
	Kitty Hawk
	American Eagle
	Centurion
	Whittlesey Avian
	Simplex
	Kitty Hawk
	Spartan
	Crown
	Lenert
	Fleet
	Collegiate
$5,000	
	Simplex
	Travel Air
	Command-Aire
	Monosport
	Wallace
	Eaglerock
	Swallow
	Travel Air
	Command Aire
	Eaglerock
	Travel Air
	Command-Aire
	Monosport
	Waco
	Shamrock
	Eaglerock
	Fairchild KR
	Eaglerock Bullet
	Spartan
	Spartan
	Collegiate
	American Eagle
$7,000	
	Savoia Marchetti S-56
	Federal
	Cabinaire
	Waco 220
	Cabinaire
	Cessna
	Curtiss Robin
	Neilsen
	Invincible
	Murchio
	Monocoach
	Butler Black Hawk
	American Eagle
	Rearwin
	Travel Air Speedwing
	Pitcairn
	Stinson, Jr.
	Swallow
	Waco Taperwing
	Eastman Sea Rover
	Sierra
	Eaglerock Bullet
	Cessna
	Temple Commercialwing
$9,000	

* Several makes will fall into more than one price class depending on the type of motor with which it is equipped

BRIEF NOTES OF THE MONTH [*Continued from page 70*]

sixteen and was graduated from Parks Air College.

Norman G. Souther has been named ground school director of the Spartan School of Aeronautics.

Ralph A. Reed has been appointed chief pilot of the Stout Air Lines.

TRANSPORT

Twenty-six new commercial, scheduled air transport services were established during the first six months of 1929, or double the number for the corresponding period of 1928. In addition, there were seven new operations other than domestic, which include mail and passenger service between the United States, Canada, Mexico, West Indies, Pan America and South America.

Lehman Brothers and the banking firm of G. M. P. Murphy are reported enquiring into the possibilities of a great air transport system. The Dollar Line is considered as part of the system. Credence to the report was given when Dr. Hugo Eckener met with New York banking leaders shortly after his world circling trip.

Preparations for the inauguration of a twenty-hour air service from Chicago to San Francisco are nearing completion. The announcement of plans was made by K. K. Knickerbocker, Chicago manager of the Boeing system. According to plans, passengers will leave Chicago at 8 a. m. and arrive on the coast at 4:30 the next morning; leave San Francisco at the Oakland Airport at 8 p. m., arriving in Chicago 6 p. m. the next day.

Scarcity of good pilots is holding up aviation, Anthony G. Fokker declares. Speaking of the larger planes now being built, he said, "While the future size of transport planes is apparently unlimited, 100-passenger giants of the air are not yet economical."

Reduced air passenger rates, instituted over the Southern Air Transport System on Aug. 1, have brought sufficient new business that every week-end two planes instead of one are being run each way on both the Dallas-El Paso and the Dallas-Brownsville lines, Victor F. Grima, assistant general traffic manager announced.

An aerial taxi service has been inaugurated by the Curtiss Flying Service of Cleveland. The service is between the Herrick Airport and the Cleveland Airport. It was established for passengers who want to avoid the long auto trip through Cleveland. The flight is made in less than 20 minutes.

Continuous voice communication between pilots and planes on the 2,000 mile air span between Chicago and San Francisco will be inaugurated with the completion of power circuits to connect with ground radio stations at 14 points in seven states. The work is being done by the Boeing system.

Declaring that there is "no conflict between airplanes and lighter than air craft," Col. Charles A. Lindbergh asserted that "the dirigible as now developed is superior to the airplanes for transoceanic flying." He sees increased use of either as a benefit to the other.

Inauguration of a "local" air service for passengers and express between Chicago and Detroit is announced by the Stout Air lines. A three-hour schedule was to be maintained, with stops at South Bend, Kalamazoo, Battle Creek and Jackson.

Curtiss Flying Service has been broadcasting from aviation station WRNY on the top floor of the Roosevelt Hotel in New York for several months. Every Friday evening, between eight and nine, there have been varied types of programs sent out on the subject of flying.

Three north and south trans-continental air mail, express and passenger lines now link Mexico City with both the Atlantic and Pacific seaboards. Pan-American Airways, Inc., Pickwick Latin American Airways and Compania Aeronautica Transportes are the lines.

With 242 passengers carried between New York and Boston during the last week in August, the Colonial Air Transport broke their previous record by 24. Boston to New York passengers numbered 123; there were 119 north bound.

Flight surgeons, who will regularly examine pilots, mechanics and other operating personnel and rigidly regulate the plane, field and shop conditions under which they work, have been retained by the Universal Aviation Corporation.

Formation of Hawaiian Airways Company, Ltd., for the purpose of conducting a general aviation business in and between the various islands of the Hawaiian group was announced by Nathan Newby, Sr., head of a group of Los Angeles and Honolulu capitalists.

Prediction is made in "Trade Winds," publication of The Union Trust Company of Cleveland, that a unit system of transportation will come in the future, with rail, air, water and highway transportation united into a single, integrated service.

Continental Air Services, Inc., are the first to connect Chicago, Memphis and New Orleans by air. Land planes are used for the Chicago to Memphis leg and amphibians for the Memphis to New Orleans hop.

Forty-eight hours service between New York and Mexico City was announced by Robert J. Smith, general traffic manager of the Southern Air Transport System.

An average monthly increase in passengers of 26 per cent since Jan. 1, 1929, was announced by Joseph W. Sabin, general passenger agent for Universal Air Lines.

Ten new airways are now under construction, totally 2,065 miles. Approximately 10,180 miles of lighted airways are now in operation in the United States.

An increase of 59,252 pounds of air mail carried in August over the total for July makes that month the greatest in history. A total of 698,062 pounds was transported in August.

MISCELLANEOUS

Figures compiled by the Aeronautical Chamber of Commerce show that 4,232 licensed planes and 2,885 unlicensed planes are operating in the United States, computed for July 15, 1929. California has one plane for every 8,778 people and the District of Columbia one for every 9,200; Washington third with one to every 14,694; Delaware fourth, one to 15,215; New York fifth, one to 15,338, and Oklahoma sixth, one to 18,104. Open land biplanes lead in number of licensed aircraft, having a total of 2,991; cabin land monoplanes are next favorite, having a total of 1,093.

Aircraft Radio Corp. of Boonton, N. J., in cooperation with the Rome Wire Company and the American Bosch Magneto Corp. has developed a system of shielding ignition equipment which "suppresses interference with beacon receivers and at the same time provides ample ventilation to prevent spark plug difficulties." It is believed the shield will do away with trouble during wet weather.

Walter S. Marvin, president of the Curtiss Airports Corp., declared recently that the future development of aviation in the United States will rival that of the auto and rapidly will pass that of Europe because of superior mass production and personal initiative. Mr. Marvin announced that his concern is now engaged in construction of 25 airports in the larger cities of the United States at a total cost of approximately $25,000,000.

Tests of a new type wind generator, expected to lower operation and maintenance costs of beacon lights in isolated sections along national airways, are in progress at Alexandria, Va. The new equipment will require change of lamps and lubricant every six months and distilled water for storage batteries every year.

Correspondents and desk editors of the Associated Press have been instructed to make specific mention of the fact that a plane is unlicensed or a pilot unlicensed, if such be the case, in reporting aircraft accidents. They also have been instructed not to give undue prominence to airplane accidents and to make every attempt to be accurate.

Pilot Harry Sievers, who flies the Clifford Ball Lines, between Pittsburgh and Cleveland, made the first test pickup of mail at Youngstown, O., recently. Sievers flew low over Lansdowne Field, let down a cable, hooked into a pickup chute and drew up a dummy sack of mail.

Patents are being asked by F. J. Boerder, Cleveland, for a "submerged dirigible hangar," which is built one-third above ground and the remainder below the surface. Mr. Boerder proposes a trap-door effect for the roof, which will allow entrance of dirigibles.

[*Continued on page 74*]

INVESTIGATE • • • • • • BEFORE ENROLLING

Above—Group of Spartan training planes.

Right—Ford Trimotors at the Tulsa port.

Left—Spartan School students assembling a plane in the laboratory.

Right—Group of buildings comprising the new Spartan School of Aeronautics.

Left—A partial interior view of the Spartan Aircraft Company factory.

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LIGHTNING [*Continued from page 32*]

sible water-vapor condenses most readily upon material nuclei of dust or even upon electrons. If each tiny water-particle has at its center an electron it is easy to compute how much electricity would be brought to earth by a given amount of rainfall. This can account for high voltages but not of the same order of magnitude as those of lightning bolts. Nevertheless, this and the friction of upward currents in a thunderstorm may account for additional atmospheric electricity which in turn may account for some of the persistence of lightning effects in thunderstorms.

Lightning pursues crooked paths—paths which offer the best course. However, it does not go out of its way very much—unless enticed by low resistance or diverted by high inductance—because it is in a very great hurry. The best data at present indicate that a severe lightning stroke from cloud to ground may involve an order of magnitude of one hundred million volts. This means a gradient of a hundred thousand volts per foot. The current passing in the flash may be many thousand amperes, but the time is so very brief that the total energy is only a few kilowatt-hours.

Recent studies with "home-made" lightning indicate that when the height of a lightning-rod is 2.5 per cent of the height of the cloud above the earth, all the lightning strokes strike the rod provided the storm-center is directly over the rod. When the height of the rod is only one per cent of the height of the cloud, only about half the discharges strike the rod. Furthermore, the experiments indicate that for this range of heights of the rods discharges strike the ground closer than four times the height of the rod.

For example, if the storm-center were directly above the rod and the base of the cloud were 1,000 feet above the earth, a rod 25 feet high would receive all the lightning strokes from the storm-center. If the rod were 10 feet high half the strokes would hit the rod and none would strike the ground in a circle 80 feet in diameter if the rod rose from its center. When the storm-center has moved a horizontal distance equal to about one-sixth of the height of the rod, the rod ceases to function. In other words, the ground receives all the hits. These facts give some idea of how far lightning will go out of its way to take an easier path. Such data cannot be directly transferred into the aerial realm nor can the airplane by directly substituted for the grounded rod. However, an idea of certain magnitudes or distances can be obtained.

Certainly, data such as the foregoing indicate that an airplane need not be in the exact path of a lightning discharge or in a straight line connecting the two points of highest potential between them to be struck by lightning. If the metal wings of 50-foot span were directly in line with two clouds between which a discharge was ready or nearly ready to take place, it is possible that the discharge would be diverted to it from perhaps a hundred feet or more. Certainly, there would be a "sphere of influence" appreciably beyond the dimensions of the metal and possibly of other material of the craft. With the meager data available too much speculation would be involved in detailed considerations to warrant going into them. However, there are sufficient facts to make the writer bold enough to state that by no means are airplanes immune to lightning strokes. In fact, they would "draw" them to some extent.

No discharges take place within totally enclosing metallic envelopes. Experiments have shown that sparks cannot be obtained in such enclosures. Therefore, the all-metal "bag" of the new dirigible should be safe from explosion in this respect if the bolt did not rupture the envelope where it struck. However, if this craft were a link in the lightning's path, it would seem that persons in the cabin below would be in some danger. The metal framework of a Zeppelin should act in the same manner, but not being a complete metal envelope and having sharp edges, it would appear that sparks could be caused by a direct hit. Nevertheless, it has been reported that Zeppelins have been struck but with no disastrous results as yet.

Commander von Eckener has demonstrated that courage and knowledge of meteorology can guide an aircraft around the world through and around storms without a mishap. He knows winds and cloud-signs. He knows where the air-currents are least dangerous in a turbulent thunderstorm. He knows what little is known of the intimate details of lightning. But no man has as yet lived who can predetermine a path through the clouds of a thunderstorm which will be free from the dangers of lightning. Of course, a huge craft 770 feet long can be a link in the lightning's path and withstand the jolt without a shudder. But sparks can cause damage despite this. In the case of an airplane we have a relatively small craft and the pilot and his passengers are intimately close to the metal parts. It is difficult to imagine a hit without damage and almost certain disaster. However, there should be a relatively much greater safety in a large all-metal cabin plane.

This is the brief story of lightning based upon the little knowledge available which is transferable to the realm of aerial travel. Lightning may strike aircraft. It has been disastrous to balloons and it can be equally so to airplanes. However, the chances of aircraft being hit, if caution is exercised, are slight. Storms cover a relatively small area of the lower stratum of the atmosphere. Aircraft may avoid them by passing around them or by coming to earth. Or aircraft may ride the heights where lightning never plays because the clouds in which the bolts are made seldom extend more than three or four miles high. If lightning proves to be too prevalent and dangerous when all mankind has taken to the air, by that time cheap power and lighter power-plants may take the craft to the high skyways where air-travelers need not worry whether or not lightning will ever be conquered.

BRIEF NOTES OF THE MONTH [*Continued from page 72*]

Plans are being completed for the erection of a $200,000 clubhouse for men interested in aviation in New York. The building will be known as "The Hangar." John W. Cutler, banker, is reported the guiding spirit in the venture.

An improved oxygen breathing apparatus enabling aviators to ascend to altitudes as high as 50,000 feet without danger has been perfected by Lieut. Apollo Soucek, naval aviator.

Juan de la Cierva, inventor of the auto-gyro, claims that in the future his machine will achieve greater speeds than the airplane because of its greater adaptability.

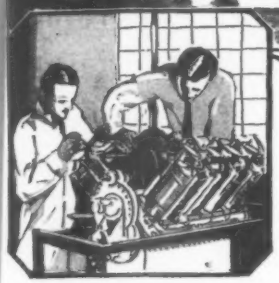
Fourteen thousand, eight hundred and fifty applications for pilot licenses were recorded in the first six months of 1929 in the United States.

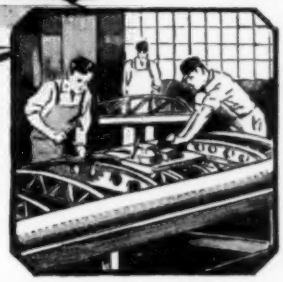
Twelve states have now more than 100 licensed airplanes owned by individuals or commercial concerns within their borders. New York leads with 753, California next with 519 and Illinois third with 300. There are more than 7,000 planes in the United States.

The National Air Travelers Association has been formed in Chicago to give "a skyway service to air-minded America." Maintenance of a complete information service of aeronautical information is one of the features of the association.

National Advisory Committee on Aeronautics have found that blindfolded pilots fly in spiral courses. Dr. Asa A. Schaeffer of the zoological laboratories of the University of Kansas made exhaustive investigations.

Perfection of an instrument which may be readily attached to every plane that will determine actually, not approximately, exact altitude in flight is announced by Herbert E. Linden, president of The American Paulin System, Inc.





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EMPLOYER'S AIR LIABILITY

[*Continued from page 19*]

injuries resulting from failure to warn spectators against the dangers.

For illustration, in the leading case of Smith v. Cumberland County Agr. Society, 79 S. E. 632, it was shown that a spectator was injured by a rope on an airship which ascended from a public park. He was not warned of the danger of being near the airship and did not know that it was going to ascend immediately. He sued the proprietor of the park for damages. The lower Court held the latter not liable, but the higher Court reversed this decision, saying:

"The owner of a place of entertainment is charged with an affirmative positive obligation to know that the premises are safe for the public use and to furnish adequate appliances for the prevention of injuries which might be anticipated from the nature of the performance, and he impliedly warrants the premises to be reasonably safe for the purpose for which they are designed. He is not an insurer of the safety of those attending the exhibition, but he must use care and diligence to prevent injury, and by policeman or other guards warn the public against dangers that can reasonably be foreseen."

Also, in Platt v. Erie, 149 N. Y. S. 520, it was disclosed that a proprietor employed a competent pilot. For the convenience of the aviator in alighting and leaving the ground, the owner had plowed, scraped, and rolled a portion of its grounds, measuring about 200 feet by 500 feet, and commonly referred to as "the court."

Upon the day in question, after the aviator had left the ground and given one of his exhibitions, he attempted to return with the airplane to alight and in doing so the machine swerved so that its wings protruded over the court and seriously injured several spectators who sued the proprietor for damages.

It is interesting to observe that both the lower and the higher Courts held the proprietor liable, saying:

"The dangers attendant upon a swerving of this machine in its landings are most apparent. With these large planes or wings, so called, extending at right angles with the course of the machine, the approach of the wheels to either margin of the court necessarily involved the extension of the wings into the crowd. And this, coupled with the forward motion of the plane, involved destruction and injury, of course. This danger was aggravated by the tendency of the crowd to surge forward, and all these attendant dangers should, and must, have been apparent to the defendant. Common prudence suggests them. The swerving of the machine might arise from failure of the mechanism of the airplane, or from errors in judgment, and lack of skill on the part of its operator. Regardless of what might cause the machine to swerve from its course, we think the defendant (proprietors) was bound to foresee the dangers of such a result."

LIABILITY OF MUNICIPALITY

GENERALLY speaking, a municipality or state is liable in damages only for the negligent acts performed by its employes in the exercise of powers and privileges conferred upon it for *private* gain or advantage, usually termed proprietary or ministerial powers.

On the other hand, it is well established that neither a municipality nor a state is liable for the negligent acts of its employes performed in its governmental, legislative or discretionary powers.

For example, in the leading case of Morrison v. MacLaren, 152 N. W. 475, it was disclosed that a state board of agriculture held a state fair and provided in connection with the fair, as a special attraction for patrons, an exhibition of flying by an airplane.

While the airplane was descending it collided with a spectator who sued the state board for damages. However, the Court held the injured person not entitled to damages, saying:

"The giving of the state fair and exhibitions is done by the state through this agency in the discharge of a governmental function to promote the general welfare of the people of the whole state, and no private or local interests are subserved. No benefit is derived by the board in a proprietary capacity, but the benefits are for the governmental and sovereign purposes of the state."

RULE OF "INDEPENDENT CONTRACTOR"

IT is important to know that where an airplane is hired for the purpose of entertaining patrons of a public grounds, having no admittance charge, the owner is not liable for injuries effected by the airplane, providing the aviator is competent and the latter has absolute authority to make the ascensions in accordance with a contract without control of the owner of the property. In other words, under these circumstances the owner of the airplane is legally an "independent contractor," and personally liable for his negligent acts.

For instance, in Smith v. Benick, 41 A. 56, it was shown that the owner of a pleasure resort hired an airplane whose owner was free to exercise his own judgment and discretion as to the means and assistants he might think proper to employ about the airplane, exclusive of the control and direction of the owner of the resort.

A patron of the park, who was injured by the airplane, sued the owner of the resort for damages. The lower Court held the injured person entitled to damages, but the higher Court reversed this verdict, saying:

"If an independent contractor is employed to do a lawful act, and in the course of the work he or his servants commit some casual act of wrong or negligence, the employer is not answerable."

The same rule is applicable where the owner of an airplane hires it *and its pilot* to another, who assumes control over *both* the airplane and the pilot.

For illustration, in Famous Players v. Industrial, 228 Pac. 5, decided during the past few months, it was shown that a film company hired an airplane and its pilot, agreeing to pay $45 rental for the day.

It was understood that representatives of the film company were to direct the pilot where and how to fly in order to bring the airplane within range of the camera.

The first flight was unsuccessful, for the reason that the plane flew too high and too near to come within the range of the camera. Therefore, the representatives of the hirer directed the pilot to make another flight lower and farther away than before. The pilot, after some demurring upon the ground that the lower flight would be dangerous, but after no conference with or direction from the owner of the plane, obeyed the instruction of the representatives who were directing the filming of the scenes, and flew across its range of vision much nearer to the surface than they themselves deemed safe, with the result that toward the close of the flight the plane was caught in an air pocket and crashed to the earth, killing the passenger and seriously injuring the pilot.

Suit was filed against the film company for damages as a result of injury to the pilot. It is interesting to observe that the court held the pilot entitled to recover damages.

OWNER OF GROUNDS CHARGING ADMISSION

HOWEVER, it is important to know that where a person purchases a ticket for admission into a park, grounds, or pleasure resort, the legal rule is that the owner of the property is bound to exercise care to protect *all* patrons against injuries, irrespective whether the operator of an airplane is an independent contractor.

[*Continued on page 92*]

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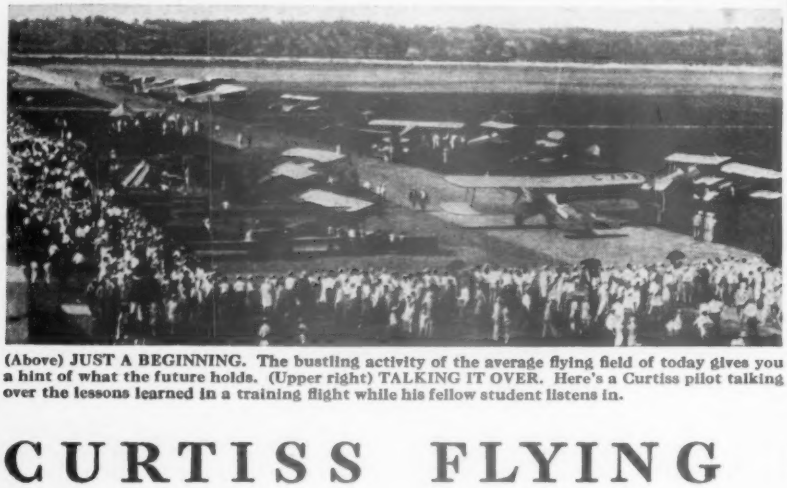

(Above) JUST A BEGINNING. The bustling activity of the average flying field of today gives you a hint of what the future holds. (Upper right) TALKING IT OVER. Here's a Curtiss pilot talking over the lessons learned in a training flight while his fellow student listens in.

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AERIAL NAVIGATION [*Continued from page 58*]

sextant is all that is needed for the novice to get his eye in, and one of these can always be picked up in any seaport for a few dollars. Now, armed with a sextant, practice "bringing your star down," not necessarily to the horizon, the top of a house or any other convenient mark will do. Learn to pick up your star quickly, "shoot it" and read off your angle. As the student progresses he will learn the value of a Star Telescope for his sextant—these can be purchased at a reasonable price. As a beginner and when "shooting the brighter stars," better results will probably be obtained without a telescope of any sort. Just sight your star through the telescope "collar" on the sextant.

After reasonable proficiency has been attained in clear weather an attempt should be made with a cloudy sky. The sextant must now be supplemented by a Nautical Almanac and Burdwood or Davis' Azimuth Tables. The former contains a list of the Stars, with their magnitude, declination and right ascension, and the latter, given the dead reckoning latitude, the star's declination and the apparent time, will give you the azimuth or bearing of the star you require. Using the latitude of the observer and the star's declination an approximate altitude can be obtained. Clamp this angle on the sextant, sweep the horizon in the direction indicated by the azimuth already obtained, and you should easily pick up your star.

What is wanted for the aerial navigator is a compact volume, comprising an abridged almanac, an abridged set of Azimuth Tables and possibly a set of star altitude curves or their equivalent, or perhaps, better still a series of compact volumes dealing with certain latitudes. Something of this sort will undoubtedly be forthcoming soon.

The Planets

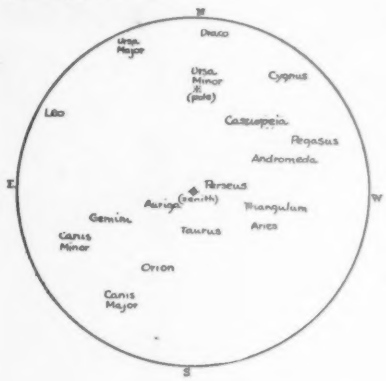
THE beginner will frequently be troubled by the presence in some constellation of a bright star that outshines all the rest and that is not shown on any of his charts or tracings. The stranger may at once be set down as one of the planets, Jupiter, Saturn, Mars or Venus. The other two planets, Uranus and Neptune, will not give any trouble of this sort. Uranus is *never* and Neptune but very seldom visible to the naked eye.

Practice will enable the star-gazer to readily distinguish the planets from the true stars. The former shine with a steady light and do not twinkle as do the stars. This is due to the fact that the former are much nearer to the observer and are luminous only with reflected sunlight, while the latter shine with a piercing light of their own. No planet remains long in the same position with regard to adjacent stars and they may be identified by observing this motion, from west to east across the sky.

To make things a little more complicated this motion is not constant and at times is *reversed*. In the case of Mars, Jupiter, and Saturn this reversal is due to the fact that when they are in opposition to the sun the earth, being nearer the sun than they are, outpaces them in eastward motion, so that they appear for a time to move backward. Mercury and Venus being nearer the sun than the earth is, have a real backward motion. For navigational purposes we have only to consider Jupiter, Saturn, Mars and Venus. Mercury is very rarely seen because of its nearness to the sun, never at greater distance than about twenty-eight degrees.

Mars, Jupiter and Saturn are most likely to give the beginner trouble as they may appear in turn in each of zodiacal constellations at any hour of the night, while Venus like Mercury is an infrequent visitor. The best way to recognize planets with certainty is to fall back on our old friend the Nautical Almanac. There the declinations and right ascensions for all the planets are given for any time in the year, enabling the observer to prick off their position on a star chart and then note the surrounding constellations.

So much for the navigational uses of the stars and the planets, and if the reader should ask why the moon has not been included, let him turn to Norie or Bowditch and study the problem known as a "lunar."

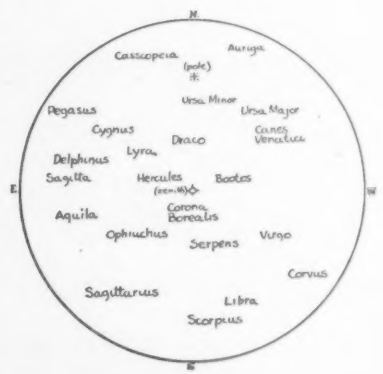


UPPER LEFT, CHART 1

January 1st, 9:00 p.m.
December 1st, 11:00 p.m.
February 1st, 7:00 p.m.
March 1st, 5:00 p.m.

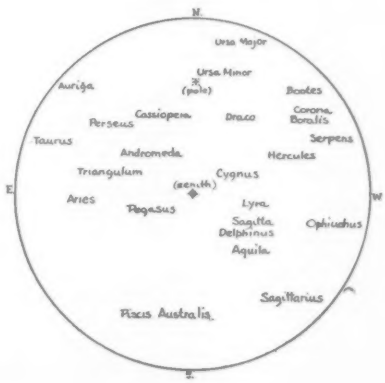
UPPER RIGHT, CHART 2

April 1st, 9:00 p.m.
March 1st, 9:00 p.m.
May 1st, 7:00 p.m.



LOWER LEFT, CHART 3

July 1st, 9:00 p.m.
June 1st, 11:00 p.m.
August 1st, 7:00 p.m.



LOWER RIGHT, CHART 4

October 1st, 9:00 p.m.
September 1st, 11:00 p.m.
November 1st, 7:00 p.m.
December 1st, 5:00 p.m.

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PROTECTING PIONEERS IN AIR TRANSPORTATION

[*Continued from page 15*]

company is not sufficient to maintain properly the overhead and set aside a sufficient amount to cover depreciation and purchase of new planes. It seems to me this is unfair to the first company. It will not result, in the long run, in the purchase of more planes; the service will deteriorate, the flying, because the planes are older, will be less safe, and there is no practical benefit, either to the public or the company itself.

The only remedy for such a situation, in my opinion, is the enactment of a Federal law, similar to laws adopted by various states, providing in substance that when a public utility such as a telephone company, for example, maintains its plant in good condition, offering the best of services to all those who may desire, that a second company shall not be permitted to enter the territory.

Public convenience and necessity statutes likewise apply to motor transportation in the state of Ohio. There is a motor transportation company operating between Lima, through Kenton to Marion, Ohio. So long as this company offers proper transportation facilities for the people within that territory, then a second company is not permitted to operate over this same route. There may not be enough business for two companies, so why divide it? In event a motor transportation company wishes to operate over a longer route, including this particular one, then its certificate would be restricted so that it could not pick up and let down passengers between Lima and Marion, but it could pick up passengers outside of that particular route for points either within or without, or pick up passengers along that route for a point beyond that particular Marion-Lima route.

I believe a similar law applicable to air transportation companies would be beneficial to both the public and the companies. It should not apply to a private carrier by air. Companies operating from a certain city but not on a regular route and schedule should likewise be required to obtain an irregular certificate and when there were sufficient air transportation facilities operating out of a city, no other irregular route certificates should be granted.

Under the present Federal law, passed in the 69th Congress and entitled "An Act to Encourage and Regulate the Use of Aircraft in Commerce and for other purposes," it is provided, among other things, that the Secretary of Commerce (the great development of commercial aviation and its regulation by the Federal Government has been under Herbert Hoover during his tenure of office as Secretary of Commerce, Congress no doubt appreciating his capacity for work and great ability, placed the power in his department) is authorized to designate and establish civil airways. Congress specifically prohibited the creating of an exclusive right, providing:

> "The Secretary of Commerce shall grant no exclusive right for the use of any civil airway, airport, emergency landing field, or other air navigation facilities under his jurisdiction."

It is my opinion that the industry has now grown to such an extent that inevitably there will come a Federal law requiring commercial companies not only to obtain a certificate to operate, but also to file their rates, tariffs and schedule with some Federal body and to deposit a bond for the protection of the traveling public. In other words, regulation of rates, services, equipment and schedules is on the way. I feel that the proper body to have charge of this important and ever growing commerce, is the Interstate Commerce Commission.

I have drawn a bill and expect to introduce it shortly, covering "A Public Convenience and Necessity Certificate" requirement for all companies seeking to operate in interstate commerce after the enactment of such a law. All companies who have and are maintaining bona fide operations at the time of the enactment of the law would obtain a certificate of public convenience and necessity as of a right, provided such companies comply with the regulations of the governing body having charge of the same. With such a certificate, the company is protected from invasion by a second company, the public is protected by proper regulations and I feel such a law would act as a stabilizer for the industry.

A company not in operation at the time the law goes into effect shall, the bill provides, file application with the Interstate Commission for a certificate. In determining whether or not a certificate shall be issued, the Commission, among other pertinent matters, shall give reasonable consideration to the convenience and necessity to the public to be served by the applicant and its existing available air transportation agencies. The bill further provides that the Commission, in deciding the matter of granting a certificate, may authorize the operation proposed in whole or in part and may attach to the exercise of all rights granted thereby such reasonable terms, conditions and regulations as in the Commission's judgment the public interest may require; the Commission would specify the route or routes over which, and the fixed termini, if any, between which the company is authorized to operate.

Any company holding a certificate under the act may operate chartered airplanes or airships in interstate commerce and may occasionally depart from its regular route for the purpose of providing special service to a point beyond such route, according to such rules and regulations as the Commission may prescribe.

The bill also provides that a certificate issued to a person shall not expire by reason of death, but a personal representative may operate under such certificate to the same extent and subject to the same conditions as decedent could, if living. The bill further provides that certificates may be transferred subject to the approval of the Commission and upon compliance by the transferee with such general rules and regulations as the Commission may prescribe. It is also provided that if a person or company engaged in air transportation violates any of the provisions of the act or fails to comply with the regulations of the Commission, that any party injured may apply to the Commission for an order against further violations thereof or revocation of the certificate.

Congress does not act swiftly in the enactment of most laws. Tomorrow, September 17th, being "Constitutional Day" I am reminded of the story told of a visit by Benjamin Franklin to George Washington at his home in Mt. Vernon. It was some time prior to the Constitutional Convention at Philadelphia. These two great leaders were discussing the form of Government that should be adopted by the states, Franklin insisting that there should be one Legislative body and Washington insisting that there should be two. They were both drinking tea. Franklin poured part of his tea in his saucer. Washington said, "Why did you do that?" Franklin replied, "To cool it, of course." Washington said, "That illustrates my theory, we should have two legislative bodies, one elected often from the people where hasty legislation might be passed, but the other body elected for longer terms and less often, would have more opportunity for deliberate consideration of legislation passed by the House."

The bill I propose to introduce should be sent to the House Committee on Interstate and Foreign Commerce. The Chairman of the Committee, after Congress convenes in December, may assign the bill for a hearing. All persons and companies interested in the bill, both for and against the measure, would have full opportunity to appear and testify. If the Committee then believes the bill should become a law, it would be reported out to the House with a written

[*Continued on page 110*]

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AIR POWER TO DOMINATE THE PACIFIC

[*Continued from page 14*]

Aircraft may be carried as deck loads on submarines; a modern submarine may carry six or more. They can be landed in their own waterproof cases and set up in a short time. The cases can be used as boats and lighters for the debarkation of other supplies. In operating overseas, a well organized air force can be ready to strike within six hours of its arrival at its debarkation point.

Any operation in the air requires that the advantages to be derived from it must be fought for, just as a corresponding operation on land requires armed contact, because if it is worth while, the enemy will attempt to stop it. To insure the operation of aircraft, pursuit aviation must be concentrated at the decisive points at the beginning of operations. To be effective, aviation has to act in concentrated compact bodies, otherwise it can be defeated in detail no matter what the size of the opposing force may be. For this and other reasons, an air force cannot operate with success from floating or seacraft airdromes against an air force firmly established on land airdromes. There is nothing whatever to fear from so-called naval airplane carriers, because not only are they unable to operate efficiently on the high seas but even if this were possible, they could not place sufficient aircraft in the air at one time to insure a concentrated operation. Consequently, a hostile air force will seize land airdromes from which to launch its attacks against its intended victims.

At present, due to the efforts of our navy, practically our whole defense in the Pacific is based on the Hawaiian Islands. Everybody knows it and there is no secret about it. Foreign nations know it better than we do. The American people ought to be informed what a terribly dangerous position we have been put in by basing our defense of the Pacific on the navy instead of on air power.

Our Hawaiian Islands have been termed "The Crossroads of the Pacific," because the route of water-borne traffic going from the Panama Canal to Asia passes directly by them, as do the routes from our Pacific Coast to Australia, to the southern part of Asia, the Dutch East Indies and the Philippines.

Before the coming of air power, these islands had great strategical value as a base for a campaign from the North American continent against Asia, because they constituted the first stopping point for navies proceeding through the Panama Canal or acting from the Pacific Coast. Since the development of air power to the point where airplanes can sink battleships with the greatest ease, a naval campaign in the old sense against Asia is an impossibility, consequently this value no longer exists. The position of Alaska is much more favorable for a campaign against Asia by air and submarine than is that of the Hawaiian Islands, because the distance is shorter.

The value of Hawaii as an air base for the Japanese, however, is very great, because direct attacks could be carried out from there against our Pacific Coast cities and the interior of the country. The possession of the Hawaiian Islands depends primarily on who controls the air above them. They can be taken by air attack or held by air defense. It will well repay us to hold them on account of the comparatively small outlay in men and money that would be required to equip an air force sufficient for their protection.

Hawaii lies about 2,000 miles from our Pacific coast. There are seven inhabited islands arranged in a curving line from northwest to southeast. The distance from the northern inhabited island, Niihau, to the southern inhabited island, Hawaii, is about 350 miles, or three hours' flight for an ordinary airplane. A fact ordinarily not thought of except by airmen is that a line of small islands and reefs extends from the main islands directly toward Japan for a distance of 1,100 miles, to Midway Island. Practically all of these little islands and reefs are capable of being made into air bases, observation points and radio stations.

Midway is about 2,000 miles from Japan or about the same distance that Honolulu is from San Francisco. It is 1,300 miles from the Aleutian Islands of Alaska. With ordinary slow speed aircraft, the Japanese could reach Midway in twenty hours, and America could reach Honolulu in twenty hours; or a flight could be made from the Aleutians to Midway in thirteen hours. Migratory birds fly from the Hawaiian Islands and nest in Alaska. The small Hawaiian finch, which is unable to land on the water, makes the flight each season over these vast expanses of sea. So does the Hawaiian plover. The flying machine can do this much more easily than can the birds, on account of its power and navigability in storms.

Our present system of defending the Hawaiian Islands is perfectly ridiculous. The last time I looked it over, I thought to myself that it was no more efficient in this day and age against a modern air attack than were the Hawaiian islanders, running up and down the beach with their spears and yelling at the top of their voices, when Captain Cook came there in 1774. Our defense is based on a land army, coast defense guns and battleships, all of which are uncoordinated. A modern boy fifteen years old who knows about air power and has had simple military training in high school could work out a better system.

As the defense of the Hawaiian Islands is based on the assumption that an attack would be made against them by the Japanese, let us assume a state of war to be impending between the United States and Japan, and the mission of the United States forces in Hawaii to be the holding of the island of Oahu for four months before the arrival of supporting troops.

Let us estimate what the action of Japan would be. Japan knows that she owes her existence to the latest developments in the art of war. She cannot hope to prevail against a great power like the United States, any more than she would have against Russia, had she, Japan, still used the organization and methods of her traditional military policy and system. She knows that the United States will probably enter the next war with the methods and weapons of the former war, and will therefore offer the same enticing morsel that other nations have done that have followed this system before. She knows also that the defense of the Hawaiian group is based on an army and navy and not on an air force.

The Island of Oahu, with its military depots, airdromes, water supply, and the city of Honolulu with its wharves and supply points, forms an easy, compact and convenient object for air attack. The whole area of the island is about 650 square miles, of which one-half is very mountainous, while the rest is taken up in great part by agricultural developments. The area having an important military bearing consists of about 100 square miles or about the same military area for air defense as the city of New York.

In selecting the weapons to be used against a location of this kind, an air force has the choice of toxic gases, explosive bombs of various sizes, and phosphorous and incendiary bombs of different categories. The means of applying these weapons consist of the aerial torpedo, which in substance is an airplane controlled and directed by gyroscopes and radio, which can be applied anywhere within the cruising capabilities of the airplane; the gliding bomb, which has a device enabling an airplane to launch it at a distance of some miles from the target without passing over it; and last, the drop bomb, which requires that the aircraft employing it pass over the target.

I believe, therefore, that should Japan decide upon the reduction and seizure of the Hawaiian Islands, the following procedure would be adopted: A bombardment brigade of aircraft, consisting of 400 pursuit airplanes and 200 bombard-

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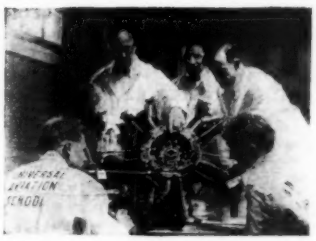

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ment planes with the auxiliaries could be flown direct from Japan to Midway Island. The route along which these flew would be patrolled by submarine vessels or airships. Midway Island would be seized either directly by aircraft or by a surprise landing with the crews from submarines. We had an example somewhat resembling this during the last war, when a British submarine sent ashore a landing party in the Dardanelles and blew up a bridge.

As Midway Island is only 1,100 miles from Honolulu and there are intervening small islands all the way within 200 miles of each other, any of which could be used as airdromes and supplied by submarines or aircraft, the attack would be comparatively easy. The weapons used from the airplanes would be:

Mustard gas on water supplies.

Phosgene gas on airdromes, cantonments and navy yards.

High explosives on airdromes, naval fuel tanks and the city of Honolulu. (The use of high explosives against Honolulu to be combined with notice to evacuate it within four hours, when it would be subjected to gas attack.)

There is no adequate defense against air attack except an air force. This can be supplemented by auxiliaries on the ground, such as cannon, machine guns, and balloon barrages, but without air power, these arrangements act only to give a false sense of security, such as the ostrich must feel when he hides his head in the sand. Our air forces in the European war lost less than one-tenth of one per cent from ground anti-aircraft defenses of all kinds. Furthermore, ground defenses can be easily neutralized, particularly if they are attempting to act independently and not attached to the air force.

Consider what an air attack such as has been described against Hawaii would mean, undefended as it is today with modern aircraft; and bear in mind that such attacks could be repeated at least three times a day unless stopped by an air force.

I have cited the landing on Midway Island to show what can be done, that instant communication with Japan is assured and that an aeronautical advance on Honolulu can be made immediately afterward. Once a permanent footing was obtained by an enemy on any of the islands, Oahu could be reduced by aeronautical siege and no amount of sea power or land power would be able to stop it, because aircraft would sink or destroy the surface ships as fast as they appeared. Even could aircraft carriers or transports reach the vicinity of the islands, they would have to establish themselves permanently on land in order to operate effectively.

If we desire to hold the Hawaiian Islands, we must base our defense on an air force capable of covering effectively not only every inhabited island of the group, but the string of reefs, small islands and shoals that extend from Oahu eleven hundred miles in the direction of Japan. Commercially, we must extend our airways all over the Pacific, both by airplane and airship.

The Philippine Islands are a source of strategical weakness to us instead of strength. Japan is practically joined up to them by an airway through her islands which extend to one just south of Formosa, called Botel Tobago. That island is just sixty miles away from the northernmost island of the Philippine group. From there on is a continuous chain up to the island of Luzon which contains the city of Manila. Commercially, we can trade with Asia without an armed base in the Far East, which was a necessity thirty years ago. Should we become involved in war with any Asiatic power, Alaska is closer than the Philippines to the vital points against which we would strike.

The United States' colonial policy does not contemplate exploiting either the people of the islands or their resources in a way that would militate against the well being of the inhabitants, so that economically there is no particular reason for the United States staying there. Politically, however, there is a decided reason. Should we evacuate the Philippines, they would be seized immediately by Japan. The people would be enslaved in the way that those of Korea and Formosa have been. The Japanese would then complete a system of airways and military depots along the islands blanketing Asia and would make a Japanese lake of the water between these islands, on which no commerce could move without their permission.

Our evacuation of the Philippines would mean the extinguishing of the Dutch Empire in the Far East, because the Japanese would immediately begin propaganda among the natives, which would cause insurrections and serious trouble. This, in combination with Russian activities from the north, would probably lead eventually to an uprising of the people of India and a serious blow at the British Empire.

Therefore the United States should keep the Philippines; but to sit down on the Philippines and attempt to defend them would lead to nothing. The best defense of the Philippines against the Japanese would be a direct attack against Japan from Alaska.

The military policy of the United States in the Philippines therefore should be to maintain only sufficient military power to insure peace and tranquillity among the natives and to have small operating forces to use in the Asiatic theater for the protection of American lives and property. To do more than this would lead to a useless waste of lives and treasure in case of war.

Outside of the United States proper, Alaska is our most important point with regard to our protection against Asia. The distance to Hawaii from Alaska is only 1,300 miles, as compared to 2,000 miles from our Pacific coast. Alaska is within striking distance of any place we want to approach in Asia, either commercially or in a military way.

LITTLE did Secretary Seward know how well he was building when he insisted that Alaska be purchased from the Russians. We were fortunate indeed to get it as cheaply as we did, that is, at $7,400,000. The story as to how it was purchased has only recently become known, as it was never published for reasons of state. It seems that before the Civil War, the Russians proposed that they sell us the territory of Alaska. They had just finished a war with Great Britain in the Crimea, and were having a great deal of trouble over Alaska, because this province touched Canada and there was constant strife between the fur traders, the British Hudson Bay and Northwest Companies and the Russian American Companies. Russia thought that by interposing the United States between her Siberian possessions and England's Canadian possession, she would be placing a neutral of tremendous military potentiality between themselves. She agreed to sell the territory to the United States for $1,200,000.

At this juncture, the Civil War broke out, and the hands of the United States were tied. No great nation of Europe was friendly to the Northern side with the exception of Russia. We were on the point of war with Great Britain over the equipping of privateers in British ports for the Confederacy, and with France over the seizure of Mexico. The United States needed a friendly demonstration from a great power and Russia was asked if she were willing to send a fleet to New York and another to San Francisco on a visit of friendship and good will. She replied that she would be delighted to do so, but the trip would have to be paid for by the United States, as they themselves were short of money. Upon our inquiry, Russia stated they needed about $6,200,000 to defray the expenses of the friendly visit. Naturally, Congress could not be asked for this amount, as then it would be plainly shown that the friendly visit was purchased by American money and its effect on the other nations would have been diminished accordingly; so nothing was said about this sum of money until after the Civil War, when an appropriation of $7,400,000 was granted by Congress—$1,200,000 for Alaska and $6,200,000 for the visit of the fleets.

[*Continued on page 96*]

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JAPAN'S HAMPERED PROGRESS [*Continued from page 30*]

cation of civil aviators sent from the aviation bureau of the department of communications. The civilian aviation schools are fairly numerous in print, but few in practice, with only handfuls of pupils. They are hampered by old-fashioned machines, rebuilt motors and a lack of popular interest.

The total number of students at all the aviation schools including those of the army and navy, is this year less than 200. The total number of qualified aviators, army, naval and civil included, is about 1,000. One-half of that figure would comprise all really competent pilots in Japan. There are probably less than a score of able air transport pilots available.

There is no special school for the training of aviation mechanics. The army gives a one-year course at Tokorozawa, while the navy does the same at Kasumigaura. For engineering work the graduates of polytechnical colleges and high schools are employed.

The army is using two new 230-horsepower Salmson scouts, No. 29 Nieuports with 300-horsepower Hispano, No. 60 Farman Goliaths with 230-horsepower Salmson and No. 14 Henriots with 80-horsepower Rhone.

The army is still using some No. 1 Nieuports and No. 15 Henriots for training. The total number of army machines is semi-officially given as 600, but there are probably not that many in flying condition.

The navy is using some machines of its own manufacture and Curtiss machines. Of the motors used by the navy the 300-horsepower Hispano occupies first place. The total number of the machines is given out as 400; but, if not superior in numbers, navy flying excels in practice. The navy has one dirigible; the army none.

Until the purchase this year of Fokkers and others, civil aviation had only the Mitsubishi 13 and the Breguet 19 A 2, and "condemned" machines bought from the army and the navy.

The army and navy have several factories, but as it is the principle of the government to encourage the manufacture of arms and munitions by private corporations, this output is unimportant.

The manufacturing cost at home is from 35 to 60 per cent higher than the purchasing cost of foreign machines, which handicap government subsidies have not yet overcome. The aviation industry has not become a paying proposition, but substantial improvement is being made this year, since the offer of larger subsidies to aircraft companies and air transportation companies.

The latest report of the aviation bureau gives the following statistics on civil flying:

NUMBER OF CIVILIAN MACHINES

Water planes	21
Land planes	74
Total	95

CERTIFIED AIR PERSONNEL

Pilots	251
Navigators	51
Mechanics	38

Airplane and aeronautical motor factories:

AIRPLANES

Mitsubishi Nainenki Kabushikikaisha.....Nagoya, Japan
Kawasaki Zosenjo.....Kobe
Aichi Tokei Denki Kabushikikaisha.....Nagoya
Nakajima Hikoki Seizosho.....Ohta, Gummaken
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Regulations for controlling air navigation were promulgated in March, 1921, and put into effect immediately. In April of the same year, the aviation law was promulgated. At the same time, regulations for the inspection of airplanes, examination of pilots went into effect. Special regulations were also made providing for 1st, 2nd, and 3rd grade airplane, dirigible and balloon pilots, for 1st, and 2nd grade aero-navigators and engineers. Upon passing examinations, applicants are duly certified and receive licenses.

In 1920, the army and navy inaugurated the system of training civilian flyers, in view of the fact that private aviation schools are far from perfection in methods of training, as well as equipment. Ten applicants each were admitted annually by the army and navy corps, but after the fourth year, the number was reduced to eight. While students are training, they live in the army or navy air corps barracks at the expense of the communications department.

The general public is still in that state of indifference toward the far reaching advantages of air communication, which prevailed in America not so very many years ago. The Japan air transport companies' chief clients are Japanese who have been abroad and are proud to show their Western culture. But a beginning has only just been made. There has hardly been time to arouse the nation to the importance of Japan's great strategical situation in the future of air transport in the Far East. Yet here, as everywhere else in this world whose confines the airplane is steadily narrowing, it is only a question of time when the commercial air fleet of the land of the Rising Sun will be as powerful a factor as its sea fleet is today.

The Miami Maid, graceful flying boat, at home above the semi-tropical shores of the Florida Keys. Here this newest of native birds is a frequent and inspiring sight, glistening in the warm caress of southern sunshine.

PLANNING THE MODERN AIRPORT [*Continued from page 18*]

off and landing can well present a beautiful expanse of green lawn.

The greatest obstacle on a landing field today is, paradoxically enough, one of its greatest assets, the hangar. It is nothing more than a giant edition of the old barn that housed grandfather's horse and buggy, and in most cases an eyesore, an archaic monument to our progress in aviation. Not only is the hangar an impediment of itself, but a line drawn from the top of the hangar to the field at an angle of 7 to 1 covers the area which is wasted so far as taking off and landing are concerned. Reduction of the height of the hangar to its lowest feasible limits is therefore advisable, a step which would contribute to its heating in winter. So far our hangars are today in the stage of the sheet metal garage of twenty or twenty-five years ago, when any sort of structure was needed quickly for the family automobile.

The buildings whether placed in the center or at the side of the field should be harmoniously grouped and so placed that they can be added to in units to permit future growth. Some sort of architectural harmony should be preserved among them which in no way will detract from their utility or fitness for the purpose. It is just as possible to construct an attractive group of hangars of steel and concrete construction, glass-roofed to permit daylight illumination, a passenger station, machine shops, and so on, as it is to design a similar group for a public park.

Possibly the place for the future essential buildings for airports will be found in the center of the air field and underground, leaving the field itself as an open area unobstructed by buildings of any sort. The underground central establishment of hangars, machine shops, passenger stations, branch post offices, rest rooms, lunch rooms, customs offices, curio shops and exposition buildings would be reached by subways and tubes leading directly from the business and hotel center of the city.

Passengers would take their planes in the underground stations just as rail passengers do today at the Grand Central Terminal in New York City, the planes ascending by ramps to the surface level where the gates would be swung open to admit them to the field. The field would rise from its edges toward the center, providing natural drainage for all parts of the field. Planes on landing would lose momentum by reason of their ascent toward the center. Departing planes would gain by their descent from the center starting point.

A modification of such a plan for the present requirements would be a great field, graded from the sides up to the center to provide drainage, with the buildings located in the center and reached by underground tubes for vehicles and trolleys. From ten to twelve feet could easily be taken from the heights of hangars by partly sinking them in the ground, so that the plane can be taxied from the surface into this cellar-like basement.

As the movement of the United States mails is the most important peacetime function of aviation in this country, something should be done to remove the handicap under which the suburban air terminals must operate by reason of their distances from the post offices. Railway terminals are much more favorably located in this respect. To overcome this problem underground pneumatic mail tubes should connect every air mail airport with the post office of the city. This step would save half an hour to an hour in getting mail by trucks from the airport through congested streets to the post office. This delay occurs at either end of the line. It will be impossible to perfect our air mail service until the handicap is overcome.

Our methods for the delivery of mail are really those of the old stage coach days. Why should mail not be shot at high speed from the airport to the post office and from the post office to the building whence it is destined, and thence directly into the office of the recipient? In New York City, the New York Life Insurance has installed tubes in its new building doing away with the services, often inaccurate, of some three hundred messenger boys. In cities already possessing tube installations, like New York, Boston, Philadelphia, Chicago and St. Louis, the difficulty of extending the tube system to the airport would not be great. Mail containers made of light metal, with mail previously sorted aboard the plane could be shot into the post offices in five minutes as compared with 30 to 40 minutes by the mail truck.

The use of tubes would not only place the air mail terminals on a better footing than the railway mail terminals, but their installation in all cities adjoining airports would save large sums in the cost and operation of mail trucks which help to congest the city streets. It would release hundreds of mail clerks now occupied in handling and pouching the mails, as well as providing a continuous flow of mail between the terminals and post offices. Moreover, postal service in the big centers is not exclusively a matter of local interest. It is of great importance to millions of people throughout the country with whom those of the big cities maintain business and social relations.

Speeding up the air mail, therefore, will not only be a benefit to aviation, but will be a tremendous benefit to every large city, in which the tube system is extended or installed, in handling the huge volumes of mail that now pour through our great centers. From large terminal airports, the tubular post would provide for a continuous flow of the mail to the post office as fast as the planes brought it in. It would not be necessary to have a truck waiting to accumulate a full load or even part of a load, since a single container containing from 20 up to say 500 or 600 letters could be shot directly into the post office. The tube system is in successful operation in some of the world's great cities like New York, Paris and Berlin and it offers us one of the solutions of the difficulty.

The speedy transport of air passengers from airport to city offers a more difficult problem than that of the air mail. Yet there is no reason why subways cannot be extended to great airports of the future and run between them to the air terminal station. We are entering an era when, more and more, we will have to go beneath ground or over ground. A less expensive alternative to subways is to be found in the use of small jitney planes plying between the great terminal airports and small elevated landing stages in the city.

A great multiple-engined passenger plane carrying ten to fifty passengers obviously could not land atop a large building, or on an elevated platform above railway tracks in the center of the city. But a small auto-gyro plane could do this. There are many areas along the water fronts of cities above piers, wharves, or streets or above switching yards which might be used for this purpose. Our government must recognize the right of aerial navigation just as it now recognizes water navigation to the use of waterways. In New York we are already starting an elevated street along the waterfront, the West Side Express Highway, and I am sure that New York and other cities have established a precedent for elevated platforms for small planes.

The future airport will be built along the lines of our most modern railroad terminals. In place of the railway tracks we shall have an unobstructed area for the landing and taking off of planes. In place of the Pullman we shall have the giant five-motored transport plane carrying 100 passengers inside the wings. Planes will load and unload their passengers under cover just as railway passengers today board a railway train. The main terminal will contain large waiting rooms for men and women, ticket offices, modern shops for the sale of merchandise brought in by air, display showrooms for modern airplanes,

[*Continued on page 111*]

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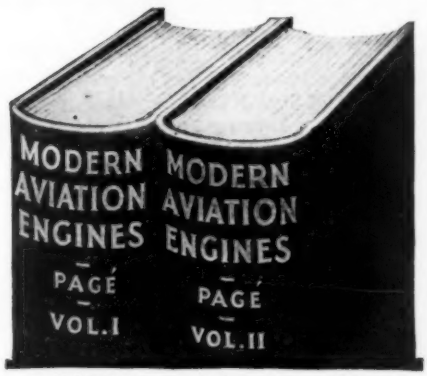

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AIR LIABILITY

[*Continued from page 76*]

For instance, in Roper v. Ulster County Agricultural Society, 120 N. Y. S. 644, a person who paid admission into grounds was injured by an airplane operated by an independent contractor. In view of the fact that he had paid admission, the court held as long as the park owner had not prevented him from going close he had a right to go there with the crowd, and awarded damages.

WHEN EMPLOYE IS NOT INDEPENDENT CONTRACTOR

ON the other hand, the mere fact that an employe is given certain privileges, or paid an agreed sum to perform a specified service, does not conclusively indicate that he is an independent contractor.

In Schonberg v. Zinsmaster Baking Co., 217 N. W. 491, it was disclosed that a baking company hired a salesman and paid him $40 per week and expenses. He covered his territory by automobile for several months when he obtained an airplane and, being a pilot, agreed for $500 cash and $75 a week to take various customers of the baking company for rides and to distribute literature and bread from the airplane at public gatherings.

On a certain day the plane was used in carrying up grocers and distributing advertising matter. After the last passenger was taken for a ride the salesman believing the airplane to be in poor mechanical condition requested an expert to ride with him. After rising in the air about 800 feet, the plane became unmanageable and fell to the ground. The injuries suffered by the salesman as a result of the accident consisted of a crushed face, broken nose, fractured skull, and loss of an eye.

He sued the baking company for compensation. The counsel for the baking company contended that it was not liable, because the salesman was legally an independent contractor and had no authority to test the plane.

However, the Court held the baking company liable, and said:

"The control or right of control is an all important factor to be considered in determining the question as to whether the relationship is that of an independent contractor or that of employer and employe. . . . . The testing of the plane, for the purpose of ascertaining whether it was in condition for use, and the securing of assistance and advice from an expert were proper precautions to take under the circumstances. It was to the interests of the employer that the plane be kept in serviceable condition. The mishap to the plane indicates its unserviceable condition and the necessity for a test."

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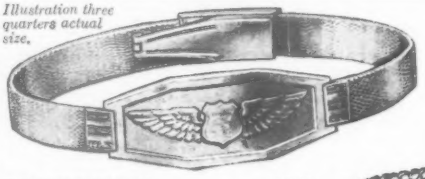

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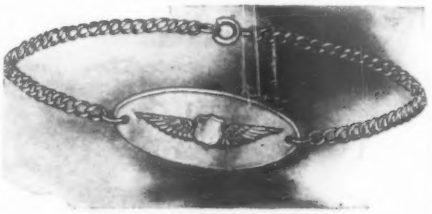

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THE KANSAS CITY AIR TRAFFIC CONFERENCE

THE sessions of the First National Air Traffic Conference, called in Kansas City, September 16-18, by the Aeronautical Chamber of Commerce of America, was distinguished for the results obtained in centering the attention of the transport operators and of the public on the place of air transport in the general transportation scheme, the need for closer relationships among the air lines, and for better facilities on the ground for speeding up transport.

It was agreed that the adventurer and thrill seeker no longer provided the chief source of revenue; that the appreciation of the value of time-saving devices by American business is the cue of the industry. With that in mind the eleven committees of the conference worked out very definite recommendations for the consideration of the operators and turned them over to the newly formed Air Transport Section of the Aeronautical Chamber of Commerce to effectuate.

The problem now is not one of time to be saved while flying, but rather one of time to be saved on the ground in order not to lose the advantage gained in the air. It applies alike to passenger business and to mail and express.

In the passenger business it is woven around the airport which, in most cases, is located from thirty minutes to two hours from the heart of the city. In asking of what avail is the saving of two hours in the air when an hour and a half is lost in getting to and from the air terminals, the committee on airports recommended a terminal in the heart of the city at which planes would only load and unload passengers. The hangars, shops and servicing facilities would remain at outlying fields.

Taxiways running alongside the regular runways to cut down time lost in taxiing from the landing runway to the unloading platform, barriers to prevent access to the field of the public as well as passengers, elimination of flying schools from transport fields and the adoption of the uniform code of air field rules as soon as it is perfected and approved were other recommendations of the airport committee.

The perfection of a device for picking up mail on the fly was looked upon by the committee on handling air mail and express as one of the most important means of saving time and of bringing air mail service to every community of any size in the United States. Such a device was expected to be developed sufficiently within a few months to enable it to be placed into general use.

It was announced the Post Office Department would place 3,000 small pouches having a capacity of five pounds each in service October 1 for use in dispatching mail destined to pass through junction points. Each pouch would bear the exact destination of its contents, to eliminate the necessity for handling the mail at such points.

That revenues from air mail cannot be materially increased over their present amounts, because the poundage rates may be expected to be reduced, was the belief of many attending. Poundage will be increased so that the lines may expect their revenues from larger loads at lower costs. The other side of the mail and express business was, however, highly encouraging. It was declared that within the next two years air transport companies will be able to carry express profitably at the same rates as the railroads with far speedier deliveries. It is to be brought about by larger and more efficient planes, and, it is believed, will be a greater revenue producing business than that of carrying passengers.

Other recommendations were "added safety measures" through the development of the two-way radio telegraph or telephone, better protection against propeller blast for passengers loading and unloading, standard commissions of five per cent for agents selling tickets, studies of insurance rates with a view to rate reductions in accident insurance for passengers, standardized interline accounting systems, circularization of all other lines when one line makes changes in rates or schedules.

When the question of governmental regulation was brought before the conference in the form of a motion in favor of asking Congress to provide a body similar to the Interstate Commerce Commission, it was ruled out of order. The operators did not want it. Inferentially they agreed that the business must be kept clean; that they must avoid the pernicious habits which brought on governmental control of railroads.

Appendix — Attitude — Bed — Bootleg — Breathing — Bridle — Bus — Cabre — Carpet — Crab — Dep — Drag — Drogue — Eagle — Egg — Feel — Fishtailing — Flamer — Freeze — Gap — Gland — Godunk — Hog — Horses — Hunting — Jazz — Kee-Wee — Left — Nest — One-Point — Pancake — Pill — Revs — Rubber Cow — Set Down — Sky Hook — Soft — Soup — Squash — Stretch — Tack — Tin Goose — Tripe — Washin — Washout — Whip Stall — Wind Up — Wipe Off — Wing Over.

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AERODYNAMICS

[*Continued from page 64*]

position, the pitching motion evidently changes the angle of incidence of the tail surfaces. With high aspect ratio there will be a more rapid change in the lifting properties in the high aspect ratio tail surfaces, and they will provide a more powerful restoring moment.

At the same time tail surfaces of high aspect ratio will have less of their length in the slip stream, and therefore be less influenced by the power off and the power on variation.

The usual tail surfaces have an aspect ratio of 3. Unduly high aspect ratio introduces structual difficulties, and also makes the tail surfaces stall earlier, and therefore less effective at the stall condition of the main airfoil.

Ample Control as Well as Longitudinal Stability Required

THERE is one important point in design which is often forgotten: there should be ample longitudinal stability, but there should be also ample longitudinal control.

No matter how stable the airplane is, the elevators should be able to overcome the natural stability of the airplane. If the elevators are not powerful enough, it may be impossible to overcome the stability at high angles of attach and therefore impossible to set the machine down at the proper landing altitude.

When the area of the tail surfaces is increased therefore it may be well to increase the area of the elevators as a proportion of the total tail area.

PACIFIC SUPREMACY

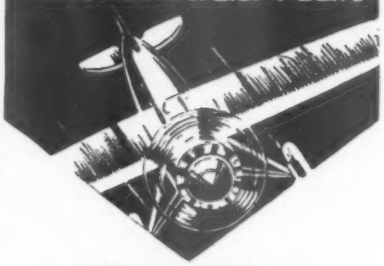
[*Continued from page 86*]

We may well marvel over this small price. The value of the total products of Alaska, from the time it was annexed in 1867, to date, amount to over a billion dollars. During a single year now, her minerals, furs, fish and other products amount to more than $70,000,000 or almost ten times the purchase price alone.

Not only is the economic value of Alaska tremendous, but her strategic value is even greater, as already explained. In a contest between this continent and Asia it would be decisive. Alaska is the "tete du pont" or bridge head, for European culture as exemplified in America, as opposed to Asiatic culture.

In summation, we can make the statement without fear of being gainsaid, that air power is the deciding factor in our defense of the Pacific; without it, any attempt to hold our possessions or protect our own country against an enemy will be fruitless.

AIR MINDED MEN



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B. C. FORBES FORESEES WINTER LETDOWN [*Continued from page 22*]

exchanges are usually satisfactory to the small company. If a period of depression and readjustment appears in the future it will pay the investor to be in the large and strong concerns rather than in those inspired by stock promoters rather than by actual economic need.

Leaders appear to have realized the dangers of too-rapid expansion, and the industry has given some indication of drawing down its schedules in the past month. The result has been an irregular market for most of the aviation stocks, with some of them sinking sharply. We have previously warned AERONAUTICS readers that such intermediate reactions must be expected from time to time. They do not mean that confidence is being undermined but simply that previous over-enthusiasm is being replaced by sounder fundamental assessment of true values.

The fact that general stock market prices have risen to unwarranted heights under the stimulus of public excitement is no secret. On a basis of recent prices, many industrials have been selling from 20 to 30 times their annual earnings per share. The normal price-earnings ratio used to be ten times earnings, and it is difficult to justify quotations of more than fifteen times annual earnings per share.

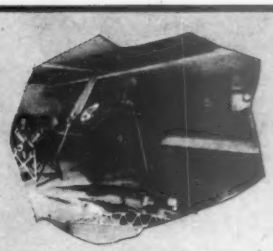
On such a basis many of the aviation stocks have also been selling at inflated values. The reasons generally assigned for the bull market in industrial stocks are prospects for higher profits next year. Even in the field of general business it will be surprising if average profits per share for 1930 compare favorably with those of the current year. In the aviation field the same doubt holds true, though it is not apparent at this time that any intermediate decline in the field will be particularly long-drawn-out.

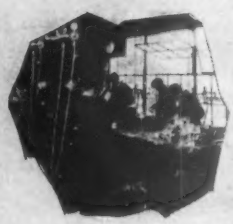
Prospects for the general stock market continue good from a purely technical standpoint, despite the usual intermediate reactions. Prospects for the aviation stocks as a group are perhaps not so strong as for the entire market but, on the other hand, they occasion no necessity for dumping sound issues. For perhaps the next month or two it would appear only a conservative course to keep aviation stock commitments from growing unwieldy in order to have a backlog of cash funds on hand with which to pick up bargains in this group if they appear during the Winter months. It goes without saying that the weaker issues should be weeded out of one's holdings; but so long as the individual investor is not over-extended there is no visible reason for sacrificing sound issues of strong corporations whose long-term prospects continue favorable.

Among the better aviation issues at this time we would continue to list such stocks as Curtiss-Wright, Aviation Corporation of Delaware, Bendix, Transcontinental Air Transport, Western Air Express, United Aircraft & Transport, Packard Motors and Goodyear Tire & Rubber.

Packard Motors has good possibilities in the aviation field through development of its new Diesel airplane motor, as well as in the automobile field. Goodyear should benefit from plans for regular trans-Continental and trans-oceanic dirigible lines through its control of Goodyear-Zeppelin Company.

As a general tendency it appears probable that the profits for transport companies, especially those having long-term contracts for air-mail transport from the Government, may hold up more steadily than profits of the companies whose interests are entirely in the producing field.





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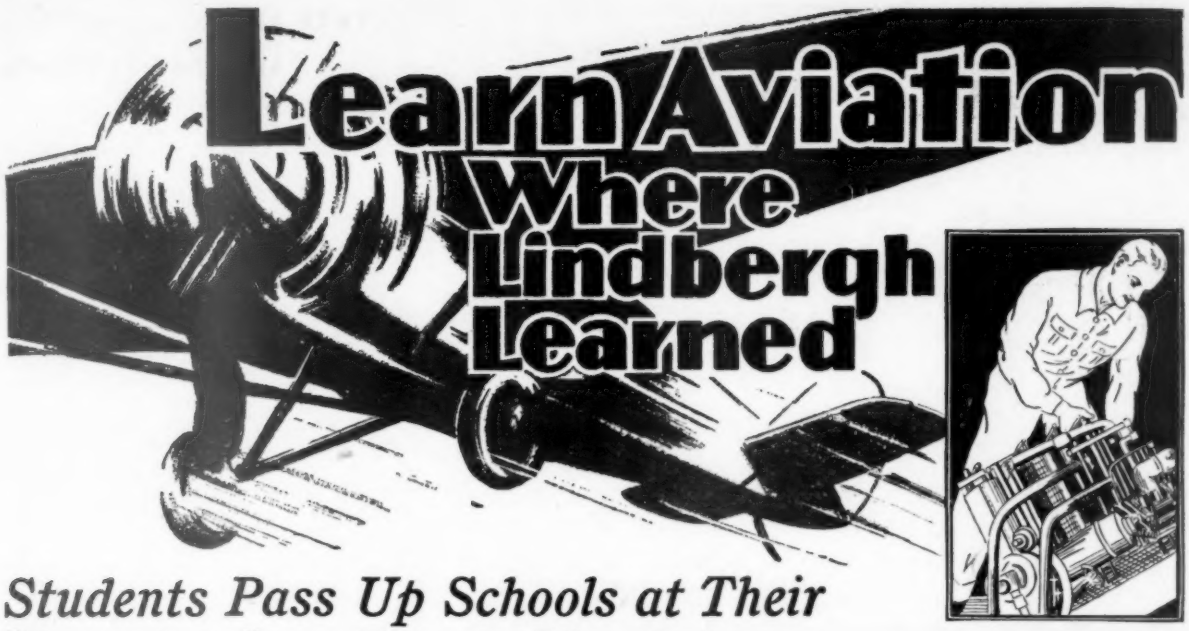

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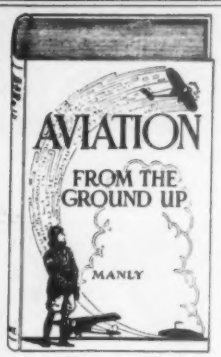

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FEDERAL APPROPRIATIONS

[*Continued from page 24*]

majority of them are only lieutenants or captains in spite of the fact that many of them have spent years in the service. Commercial companies are offering these pilots flattering and fabulous salaries to come into commercial aviation but these men are imbued with an ideal. They are simon-pure patriots, wedded to a service that they love, and few of them are giving even a second thought to any invitation to desert the service for commercial gain.

If Congress could be made to better understand the problems of the army and navy officers the services would fare much better. But getting them to understand is the difficulty to be overcome.

One member of Congress not so long ago made a speech designed to place army officers before the people in a light which is anything but the true one. He pictured them as lazy, shiftless men with only an ambition to build up a military class of society that they might gratify their longing for social prestige. Their actual worth! Well that could be dismissed by the snap of the fingers. And when the Furlow, McSwain, Wainwright and other promotion bills were before Congress last winter it was worth a trip to Washington to hear many members of Congress express their private opinions of army officers.

I contend that every army and naval officer fully earns all that he is paid. I know that this is true of the officer personnel of the air corps. They work hard. They study, and they are building up a reputation for the air service of these United States about which she will boast to the world.

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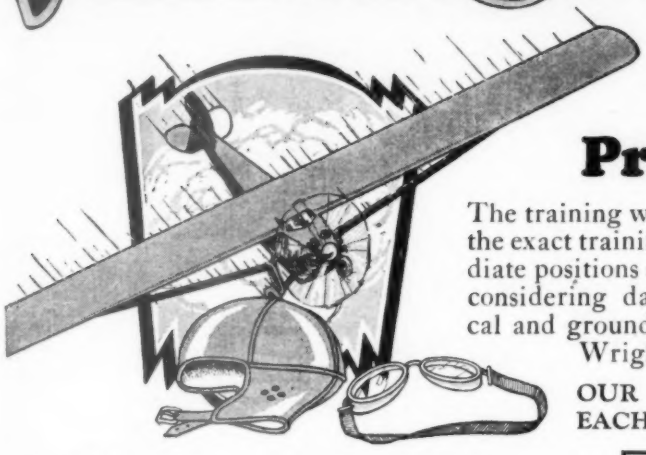

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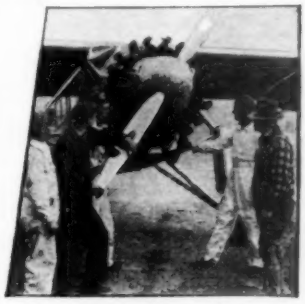

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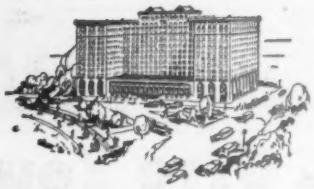

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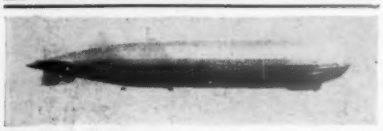

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to $65,000. During the Seventy First Congress he will receive $20,000, making a total of $85,000. It most likely will be offensive to that member of Congress to have a lieutenant of the air corps linked with him in any comparisons, but since that is the average rank in the Service, it is a fair, though odious comparison. Before an air corps officer will have been paid that much money he will be ready to retire from flying status.

Fortunately for the air corps the opinion of this member is not general. And the man who is now chairman of the great House Military Affairs committee fully knows and understands the needs of that service and he is doing everything in his power to brighten its future. That man is the Hon. Frank James of Michigan and his influence both in his committee and in the House is unquestioned.

The navy has a sympathetic friend in the chairman of the Naval Affairs committee—the Hon. Fred Britten of Illinois.

Outside the army and navy air services there is another branch of the government keenly interested in aviation and that is the department of commerce. There is also the National Advisory Committee for Aeronautics and the Air Mail Service of the Post Office Department. Every possible consideration should be given to these departments if these United States are to keep pace with other nations in the development of commercial aviation and in the establishment of air mail lines and passenger lines. The aviation industry of America does not seek government subsidies but it does need encouragement.

The appropriations for aviation outside the army and navy for the fiscal year 1930 are as follows:

National Advisory Committee for Aeronautics	$ 1,300,000
Post Office Department (Contract Service)	
Domestic	13,300,000
Foreign	4,300,000
Weather Bureau, Weather Service	930,000
Department of Commerce Inspection, Lighting and Maintenance of Airways	6,400,000
	$26,230,000

It is interesting to note in checking over governmental appropriations for 1930 that the estimated cost of the attempted enforcement of the Eighteenth Amendment is $39,950,000, or $13,720,000 more than is used for the government's efforts toward the development of commercial aviation. Regardless of our personal leanings on the much discussed question of prohibition one is forced to concede that it is not so important in our national existence as keeping this country abreast with the commercial development of the world.

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DEPT. P-11

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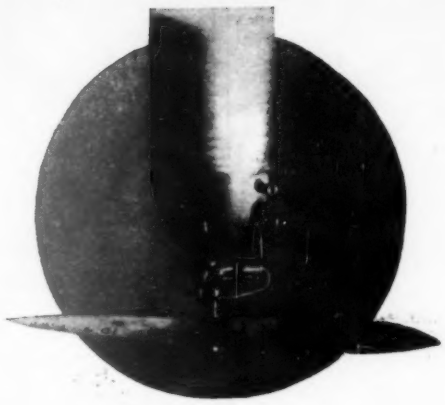


COMPRESSED AIR MODEL ASSEMBLY

Concluding Mr. Pond's series on building a compressed air model.

by BERTRAM POND

A NUMBER of model enthusiasts have written in about their compressed air models. Flights from 30 to 75 seconds have been reported for the very first models which some of the young men have built.

This is very good considering that compressed air models are relatively new to model builders in this country.

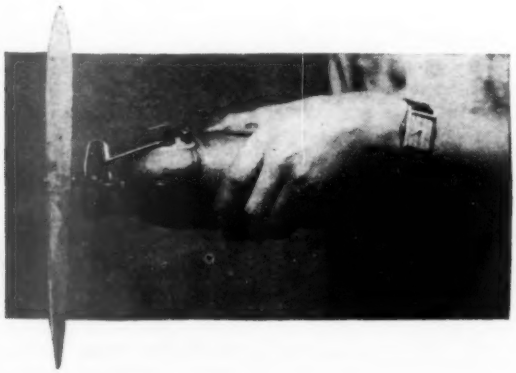
After you have become experienced with the handling of your power plant and learn how to lubricate the motor and how much pressure the tank can stand safely you will find that you can equal and even better the marks made by some of those who have rushed their models to completion.

The English have been more advanced in compressed air models than the American enthusiasts. With such good work it will not be long until the American compressed air records will far exceed the English compressed air records in the same manner that the American rubber driven model records far exceed the English rubber driven model records.

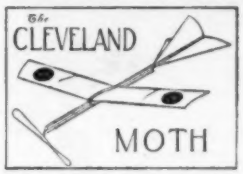
There are some points on the construction of the compressed air model which some of the model enthusiasts have asked about. We will attempt to clear up these points.

One of these points is the mounting of the motor to the tank. This is quite a simple operation but perhaps a little more explanation and diagrams than were illustrated previously will be of help.

The first thing you will need is three strips of metal, spring brass or bronze is preferred. These strips should be



Two Excellent Models



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Other models and supplies are listed in our new 16 page catalog. Send 10c for your copy. School or club instructors who will furnish us with their name on their business letterhead will receive a copy gratis. Liberal discounts will also be granted this trade.

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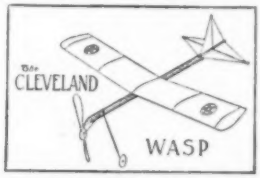

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1/8″ x 1/2″ x 3′	.045	.054
1/4″ x 1/2″ x 3′	.054	.06
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Homer Milo of Graniteville, Mass., won last month's prize with flight of 400 feet distance and 92 seconds duration. Can you beat it?

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4c postage on a pair wheels.

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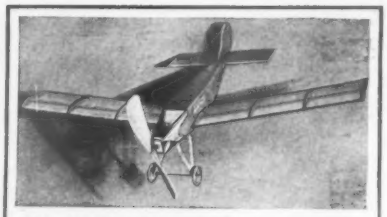
1/32" thick by 3/16" wide by 1½" long. With the hot soldering iron, tin one side on each end of each piece. Then solder one piece to each cylinder head as shown in the illustration so that the three pieces extend to the rear or just the opposite end of the motor from the air pipes and propeller shaft.

The rear ends of these pieces should all be bent outward the same amount so that they just fit the curvature of the tank end. They should be soldered to the end of the tank with the motor center line as nearly along the center line of the tank as possible. Then check the accuracy of the motor mounting on the tank by holding the propeller shaft of the motor and spinning the tank. You can then complete the alinement of the motor on the tank by unsoldering the support arms which are slightly out of position and shifting them to their correct position so that the tank will spin true when the motor propeller shaft is held.

IMPORTANT: Note that the air connection pipe from the motor should be right in line with the outlet and throttle valve connection on the tank. With the motor now in position you only have to install a short length of ⅛" outside diameter thin wall brass tube between the throttle valve and the motor air connection pipes. Simply bend the end of the piece of brass pipe and cut and fit it to length. Slip the pipe into place in the connection pipe holes and solder in place carefully all of the way around, using sufficient flux to cause the solder to flow. Your motor should now be mounted to the tank correctly and you are all ready to attach the tank and motor to the model with adhesive tape. Do not use rubber bands as when the air is all exhausted from the tank at the end of a flight the rubber bands are liable to crush the thin walls of the tank and eventually cause a crack and an air leak.

The whole model should weigh less than one pound. Some of our readers have written us that they have made or purchased slightly larger tanks than those specified in the drawing. A seamless tank 3" in diameter and 30" long can be purchased quite reasonably already made. Because of the slight additional weight of this larger tank a 60 or even 64 inch wing is recommended. The fuselage can be lengthened a few inches to accommodate the slightly longer tank. As the Hoosier Whirlwind compressed air motors, I have found from experience, work more efficiently at a higher speed, especially for pulling the slightly larger models, it is suggested that a smaller propeller as previously recommended, around 11" or 12" diameter with a 11" or 12" pitch, will produce longer and more efficient flights than the 14" propeller.



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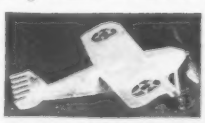

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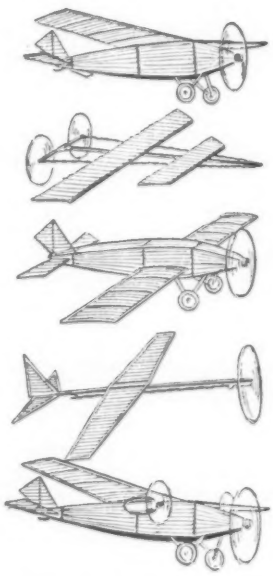

Above are a few of the many model designs you will make under this Club Plan.

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I wish to enroll in your Model Builders Club. Enclosed is One Dollar for which please send me first month's plan, membership card and discount coupons. I understand I am to receive a new plan each month for twelve months.

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For those who are using the seamless built-up purchased tanks, pressures as high as 140 to 150 pounds can be used with safety. The recommendations previously suggested about attaching a metal tube to your air pump should be followed out. Of course, in such cases the safety valves which come on some of these seamless tanks will have to be removed or else adjusted for the higher pressure.

THE Indoor Duration record has been broken by a considerable margin by Joseph Culver with a flight of 8 minutes, 33 seconds.

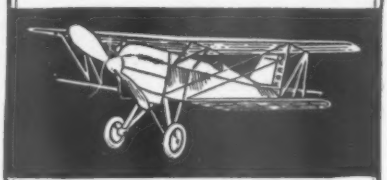
At a later date we will attempt to get an accurate description of this model for the readers of AERONAUTICS. However, in the meantime we will give you a few brief details as observed at the National Contest.

The model is a very fine performing ship and its excellent performance depends upon a number of things. A very narrow bladed high pitch propeller of considerable diameter was used with the "S" hook attached to the propeller shaft rather than to the rear hook. The propeller was approximately 13½" in diameter. The motor consisted of two strands of tough black rubber ⅛"x1/32" flat, lubricated with a special lubricant. This is the first successful use of rubber lubricant in National contests in recent years. Lubricants are always recommended but the chief difficulty is in obtaining a suitable lubricant. Culver was enabled to get a considerably larger number of power turns in his 15" motor with his special lubricant. The fuselage of this machine was of built-up hollow spar design with bulkheads or internal cross pieces all along the motor stick.

The wing span was almost 2 feet. Looking at the top of the wing it had a slight taper with narrowed elliptical tips. The front view of the wing in flight was approximately the arc of a circle. The elevator was almost triangular in section with the point of the triangle to the front. The rudder can be described as a tear drop shape with the point downward. About an inch or two of this fin extended below the elevator.

Any description of this model, however, would be insufficient to duplicate its performance without the exact weights of the parts of Culver's model. In addition, Culver is a very thorough model flier, having had a number of propellers, wings and frames in reserve. His experience in handling his delicate machine was responsible for a great part of its success.

WORD has just reached the Model Editor that a fuselage model has flown outdoors in a contest officially for 16½ minutes. This flight was made at Chicago by Mr. C. Leja.

2-FOOT CURTISS HAWK

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Send 2c stamp for bargain price list.
Universal Model Aircraft Co.
2905 East 33rd St. Kansas City, Mo.

MAGIC CARPET OF BUSINESS

[*Continued from page 34*]

And my airplane is not entirely a business machine. When I have a free week-end and want to get away from the city and up to my camp at Rainey Lake, Ranier, Minnesota, near the Canadian border, I can fly there from Chicago in about five hours. Recently I made the trip in four hours and forty minutes, while by train it is a long ride of twenty hours. However, my camp is on an island and I have to land on the Canadian side and then drive to the lake where my motor boat is waiting. With the new Sikorsky amphibian that I have purchased, I will be able to take off from the lake in front of my Chicago apartment and land directly in front of my summer camp, way up there in that beautiful, wild and rugged country.

After all, where flying makes it possible to squeeze in a bit of pleasure and relaxation along with the ordinary routine which confronts the average business man, it is still further increasing its utility to the business world. One might well call the airplane, The Magic Carpet of Business.

Mr. Dahlberg's experience would seem to indicate the ready acceptability of aerial travel for both work and pleasure by the American business man.—Ed.

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In the December issue, General Mitchell discusses the essentials of aerial supremacy.

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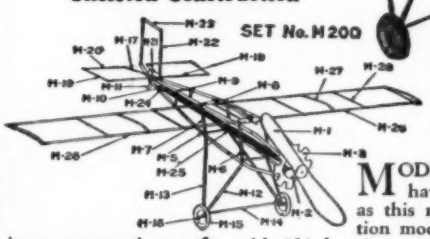

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PROTECTING THE AIR PIONEERS

[*Continued from page 82*]

report giving the Committee's reasons, and take its place on the House calendar. The Chairman of the Committee could then call up the bill for debate in the House some time during the session.

If the bill should be passed by the House, it then would go to the Senate and the procedure is similar to that of the House as to the Committee hearings, etc.

I served on the Immigration Committee of the House for several years and helped draw the present 1924 Restrictive Immigration Law. The Committee and Congress considered this bill for more than five years before it was ultimately enacted in its present form. Such is the thorough consideration which Congress gives to the enactment of an important measure.

Wonderful progress has been made in air transportation, a large amount of capital has been invested, many people are employed; and the future of our nation its development. With this development liberate legislation. My thought and desire are to aid the industry.

On pages 44 and 45 will be found a few of the opinions which Congressman Cable's proposal has elicited. Necessarily we are only able to print a few of the many received.

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THE MODERN AIRPORT

[*Continued from page 90*]

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The architecture of these buildings will be ultra-modern in keeping with the modern airplane. Greek temples or Roman Forums will no longer inspire the architect for this 20th Century problem. The architect will be called upon to develop an architecture which first of all meets the practical requirements of the problem, and then he will be expected to express his problem architecturally in such a way that archaeologists of 3000 A. D. will look upon it and say:

"This architecture was created around a new problem, the air problem of 1929. It is truly a real contribution to the history of architecture."

In conclusion I wish to say that the primary problem to be handled in making the airport attractive is one of landscaping and architecture, just as the primary question in making it safe and useful is one of engineering and aeronautics.

Why should not our airports be beautiful? Great areas like public parks, finely landscaped, with water vistas for the landing of aquaplanes, with airdromes, hangars and passenger stations suggesting permanence, beauty, and stability? Awakened civic pride demanded the departure of the old unsightly railway station from the urban scene and has put something better in its place. Why not take time by the forelock and get started toward the creation of beautiful, modern airports? Surely the public would flock to see them. If we cannot make a Versailles gardens of our airports, we can at least confidently approach their planning in a big way, with the thought of beauty, permanence and stability.

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FUTURE EVENTS

OCTOBER 29—NOVEMBER 22—World Engineering Congress, Tokio, Japan.
NOVEMBER 9-16—Western Aircraft Show at Los Angeles, Calif.
NOVEMBER 12-18—Mexican Association of Aeronautics' "Air Week."
DECEMBER 1-9—International Aeronautical Exposition at Chicago. Auspices of Aeronautical Chamber of Commerce.
FEBRUARY (1930) 5-12—New York Aviation Show. Auspices of Aviators' Post, American Legion.
FEBRUARY (1930)—National Class "A" Show, St. Louis, Mo. Aeronautical Chamber of Commerce's annual national show.
APRIL 5-13—All-American Aircraft Show at Detroit.
MAY 3-10—New York Aircraft Salon at Madison Square Garden, New York City.

WOMEN'S ACTIVITIES

The unfortunate accident from which Lady Heath is now recovering has precluded the publication of her regular column this issue. We are happy to say that according to last information, this plucky little lady is mending fast, and a resumption of her inimitable comments may be looked for in an early issue. —Editor.

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